

# Airborne Spectral Photometric Environmental Collection Technology

## ASPECT Air Quality Survey Baton Rouge, LA. 2 September 2021



### ASPECT Mission Supporting:

Eric Delgado  
On-Scene Coordinator  
Delgado.Eric@epa.gov

### Initial Mission Request

Brian Fontenot  
Louisiana Department of Environmental  
Quality

### ASPECT TEAM

Jill Taylor  
Chemical/Photometric Lead  
Taylor.Jillianne@EPA.gov  
214-406-9896

Tony Honnellio  
Radiological Lead (Detail)  
Honnellio.Anthony@EPA.gov  
617 947-4414

Ed Argenta  
CBRN CMAD FOB Branch Chief  
Argenta.Edward@EPA.gov  
202-843-4511

## Table of Contents

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### **Acronyms and Abbreviations**

Alt	Altitude (in feet)
AGL	Above Ground Level
cm	centimeter
CST	Central Standard Time
DEM	Digital Elevation Model
Digital	Digital photography file from the Nikon D2X camera
ft	feet
FTIR	Fourier Transform Infrared Spectrometer
igm	Spectral data format based on grams format
IR	Infrared
IRLS	Infrared Line Scanner
jpg	JPEG image format
kts	knots
mph	miles per hour
m/s	meters per second
MSIC	Digital photography file from the Imperx mapping camera
MSL	Mean Sea Level Altitude (in feet)
ppm	parts per million
UTC	Universal Time Coordinated

## **Executive Summary**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On September 2nd, 2021, the State of Louisiana requested ESF-10 assistance through FEMA and Region 6 asked for the ASPECT plane to be deployed in support of the response to Hurricane Ida. The state wanted assistance monitoring facility emissions in the industrial area between Baton Rouge and New Orleans, where flaring is resulting in the visible emission of black smoke.

ASPECT was tasked to perform remote chemical sensing over target properties to screen for airborne chemicals and take high-resolution photos to provide situational awareness. Potential areas identified for monitoring included: East Baton Rouge, Ascension, Iberville, St. James, St. John, St. Charles, Jefferson, and Orleans.

To support the Hurricane Ida response effort a total of 11 data collection runs (3 tests and 8 site passes) were made. Weather was conducive to successful data collection. Winds were light and predominantly from the West. Some scattered storms formed near Baton Rouge in the late afternoon that were routed around en route to the airport.

# **ASPECT Air Quality Survey**

## **Hurricane IDA**

### **Baton Rouge, LA**

### **2 September 2021**

#### **Background and Operational Overview**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On 2 September 2021, ASPECT was tasked to conduct a wide area air quality screening level assessment of areas populated with Risk Management Plan (RMP) sites and petrochemical facilities using the ASPECT system for detections of any airborne contaminants from ASPECT's 76 chemical detection library in the areas affected by Ida. The Region wanted to know if any detections were found, the location of the detection, and the concentration detected.

After collecting two data sets over the Marathon Petroleum Company, the plane returned to the West side of the Shell Norco Facility and collected data there. Next, the plane headed to the Phillips 66 pipeline site. The ground crew provided two coordinates to the flight crew with instructions to fly from south to north between the two points. The first point started at the coordinate provided by Region 6, and the second point was chosen along a linear clearing which was presumed to be an indication of where the pipeline was buried. Just north of this site was one of the LDEQ priority sites, the Union Carbide Corp. Because it was so close, the flight crew was instructed to collect data there as well before flying to Baton Rouge to refuel and upload data. All sites surveyed are shown in Table 1.

There were no chemical detections at the sites surveyed. Extremely slow satellite transmission speeds (possibly due to high bandwidth use by other first responders) resulted in long delays in data collection. Some chemical photos were pulled down during flight, with the majority needing to be pulled down with a more high-speed internet connection on the ground. Unfortunately, when attempting to process the data on the ground, the computer crashed multiple times, resulting in the decision to return to home base in Addison, TX to switch to a backup computer. The mission will resume on 03

September. It should be noted that flight 1 was a system test mission and is not included in this report. Accordingly, all data collection begins with flight 2.

**Table 1. Sites Covered on 02 September 2021 Flight**

Facility	Lat	Lon
Shell Chemical LP - Norco Chemical Plant - East Site	29.995556	-90.4097
Marathon Petroleum Company LP - Louisiana Refining Division - Garyville Refinery	30.061322	-90.5935
Shell Chemical LP - Norco Chemical Plant West Site	30.004925	-90.4224
PHILLIPS 66 PIPELINE LLC	29.923889	-90.4825
Union Carbide Corp - St. Charles Plant	29.982289	-90.4556

### **General Mission Objectives**

Once granted access to fly over the sites, the following general mission objectives were employed in conducting data collection with ASPECT:

1. To capture an overall, situational awareness of the incident using aerial photography with:
  - Oblique camera—photos taken by hand from the view/position of the co-pilot, and
  - MSIC photos—advanced camera mounted underneath the plane for a top-down view of the designated sites.
2. To qualitatively locate and characterize any the visible and non-visible components of a plume, as well as any areas on fire:
  - Using the Infrared Line Scanner (IRLS)
3. To screen for the presence and location of specific chemicals within ASPECT's automated chemical detection library:
  - Using the Fourier Transform Infrared (FTIR) Spectrometer

### **Flight Conditions and Status**

#### Weather and Site Conditions

Prior to each flight, an updated status of the current and forecasted weather, site conditions and any potential flight obstacles including radio towers impacting safety is assessed by the crew. A summary of the ground weather conditions during the missions can be found in Table 2.

**Table 2. Ground Weather for Baton Rouge, LA, Flight 2  
2 September 2021**

Time	1153	1253	1353	1453	1550	1653
Wind direction	0 degrees	0 degrees	0 degrees	0 degrees	22.5 degrees NNE	315 degrees NW
Wind speed	1.3 m/s (3.0 mph)	3.1 m/s (7.0 mph)	1.3 m/s (3.0 mph)	2.2 m/s (5.0 mph)	4.0 m/s (9.0 mph)	3.1 m/s (7.0 mph)
Temperature	31.1 C	31.7 C	31.7 C	32.2 C	31.1 C	27.8 C
Relative humidity	63	63	63	64	71	70
Dew point	23.3 C	23.9 C	23.9 C	24.4 C	25.0 C	21.7 C
Pressure	1012.9 mb	1012.6 mb	1011.9 mb	1011.6 mb	1010.6 mb	1010.2 mb
Ceiling	Clear	Clear	Clear	Clear	Few 4100 Ft	Few 3800 Ft

### **Data Results**

The following data is provided as a summary analysis. All data products are available for the Region to access on a shared FTP site. For a complete list of available products, see Appendix A. The data collected during these missions included a flight path summary, IRLS images, FTIR chemical identification and quantification, high resolution MSIC photos, and oblique photos.

### Flight Paths

Wide, slow turns are required to be made in between runs to keep the instruments stable. The blue lines indicate the flight path while the green lines indicate the specific sections of the flight where chemical data was collected and processed. On Flight 2 the Baton Rouge area was surveyed, and the flight path is shown in Figure 1.

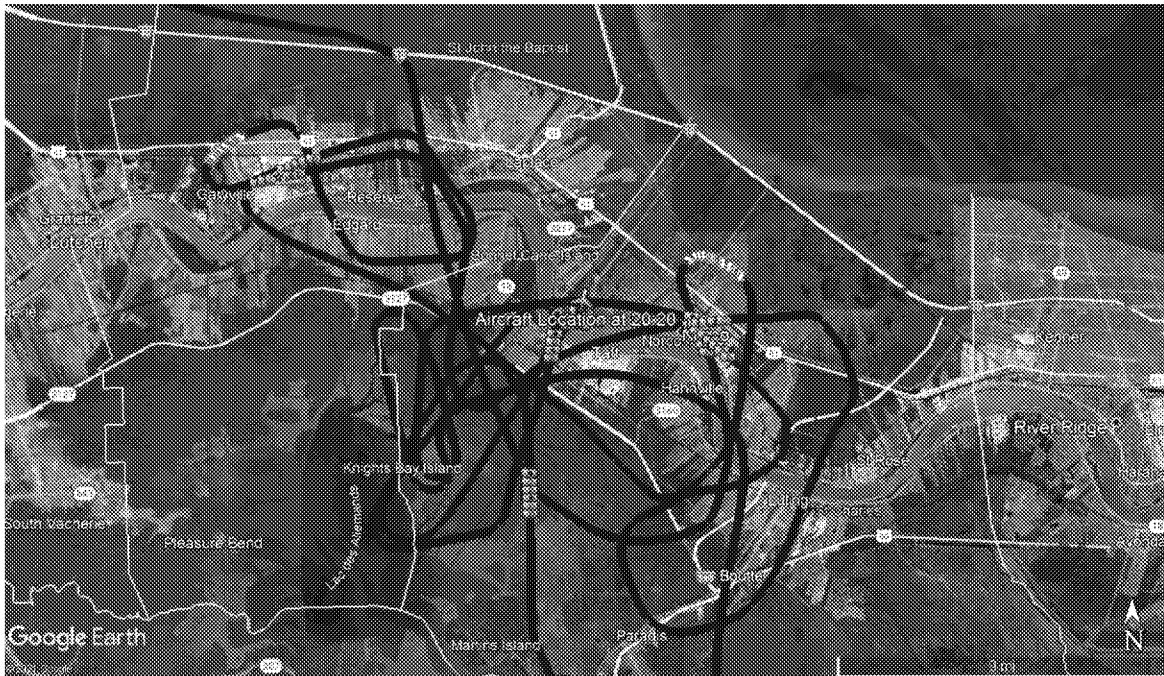


Figure 1. Data Collection Flight Path over the Baton Rouge Area Fight 2,  
2 September 2021

#### Line Scanner Data Results

A total of 11 data collection runs were made over the Baton Rouge area and during each collection run an infrared line scanner image was generated. Figure 2 shows a 3-band infrared image collected over a facility within the survey area. Examination of the image shows two small flares on the western side of the facility. Process piping throughout the facility shows ambient temperatures. No chemical plumes can be observed being emitted from the facility.



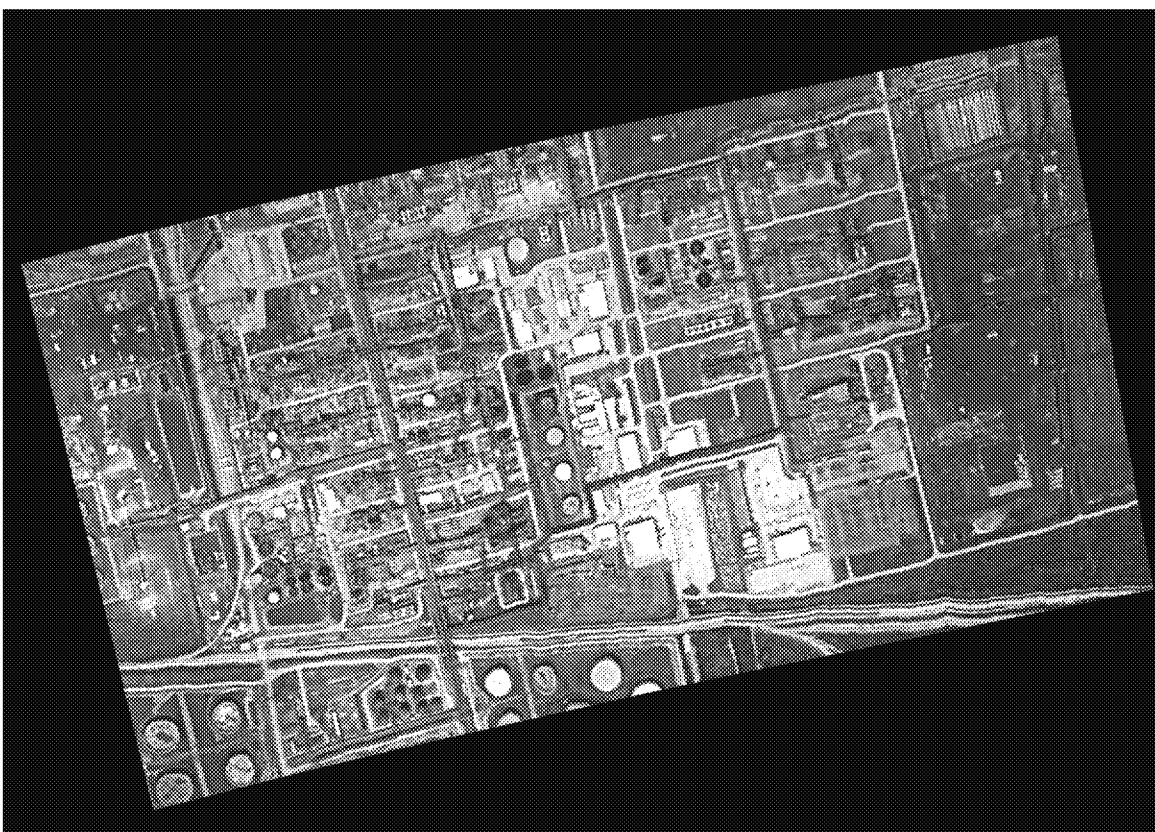


Figure 2. Three band IR image, Baton Rouge Area, Run 5, Flight 2, 2 September 2021

### FTIR Data Results

FTIR spectral data at a resolution of 16 wavenumbers was collected for each run. ASPECT uses an automated detection algorithm to permit compounds to be automatically analyzed while the aircraft is in flight. Seventy-six chemical compounds are included in the airborne algorithm library (the list is provided in Appendix B, Table 1). In addition, collected data was also manually quality checked against a collection of published library spectra for each chemical detected.

ASPECT did not detect any programmed compounds (those found in Appendix B, Table 1) as part of the mission over the Baton Rouge areas on 2 September 2021. Details of the monitoring results can be found in Table 2.

**Table 2. Chemical Results Summary  
Baton Rouge Collection Area, Flight 2**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
------	------	------------	----------	-------------------------------

1	2021-09-02	17:21:59	ND	ND
2		17:46:10	ND	ND
3		18:05:06	ND	ND
4		18:57:35	ND	ND
5		19:10:35	ND	ND
6		19:19:22	ND	ND
7		19:28:16	ND	ND
8		19:38:51	ND	ND
9		20:02:54	ND	ND
10		20:11:35	ND	ND
11		20:20:00	ND	ND

### Aerial Photography Results

A full set of high-resolution aerial digital photography were collected as part of each data collection pass. Weather conditions over the New Orleans area allowed high quality aerial images to be collected. Figures 3 and 4 show representative overhead and oblique images of the Marathon Petroleum Company imaged on Flight 2.

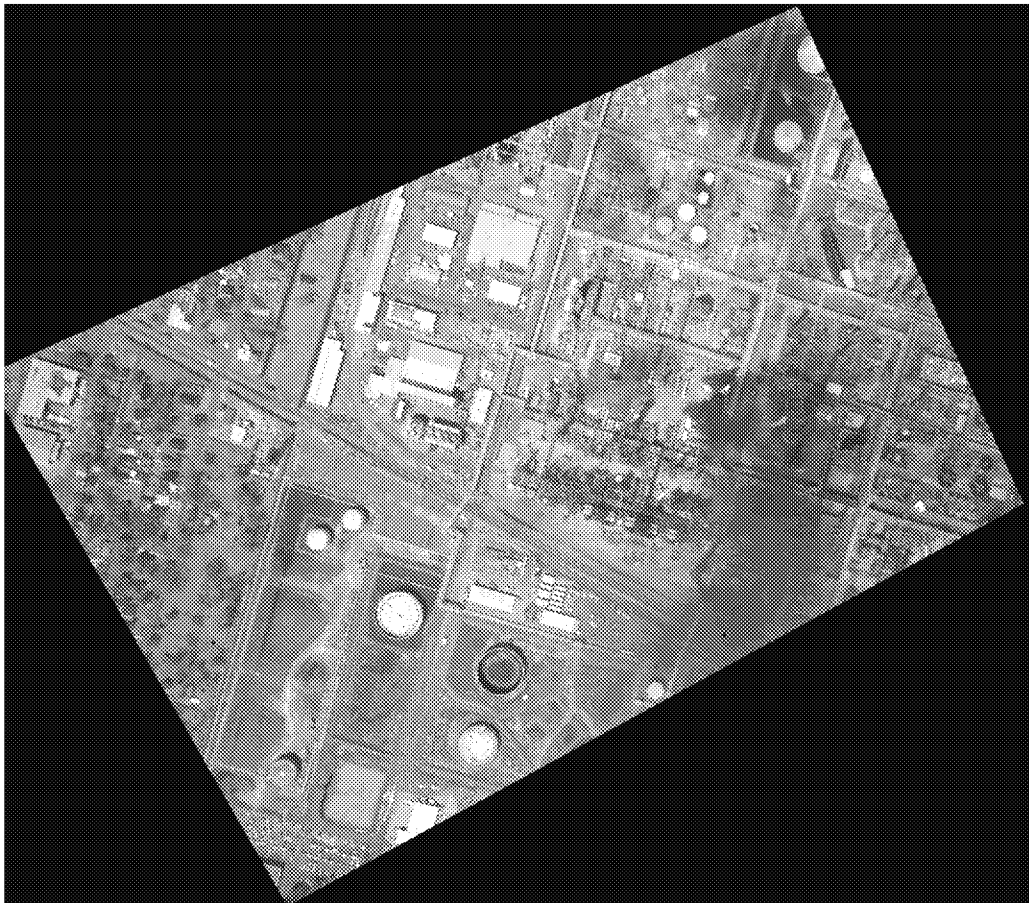


Figure 1. MSIC photo taken over the Marathon Petroleum Facility in Garyville, LA on 02 September 2021



Figure 2. Oblique photo taken over the Marathon Petroleum Facility in Garyville, LA on 02 September 2021

## **Conclusion**

ASPECT conducted one flight mission on 2 September 2021 including air monitoring survey collections over the New Orleans area. Weather conditions were favorable for all types of data collection. Although two black plumes were visible over one of the sites, no major emissions were detected with the FTIR.

**Appendix A: File Names of Data Collected During Flight**  
**Baton Rouge Collection Areas, Flight 2, 2 September 2021**

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files	Gamma Files
1	17:21:59	5185	146	20210902172205321.jpg 20210902172212572.jpg 20210902172218935.jpg	20210902_172201_A.igm	2021_09_02_17_22_04_R_01 TA=28.9;TB=49.5;Gain=3	
2	17:46:10	5179	151	20210902174616618.jpg 20210902174622981.jpg 20210902174629329.jpg	20210902_174612_A.igm	2021_09_02_17_46_16_R_02 TA=24.8;TB=44.8;Gain=3	
3	18:05:06	5177	155	20210902180512152.jpg 20210902180519405.jpg 20210902180525768.jpg	20210902_180508_A.igm	2021_09_02_18_05_12_R_03 TA=12.5;TB=32.4;Gain=3	
4	18:57:35	2900	104	20210902185742116.jpg 20210902185748465.jpg 20210902185754814.jpg 20210902185801178.jpg 20210902185807527.jpg 20210902185813891.jpg	20210902_185738_A.igm	2021_09_02_18_57_41_R_04 TA=24.2;TB=44.2;Gain=3	
5	19:10:35	2960	106	20210902191041025.jpg 20210902191048278.jpg 20210902191054643.jpg 20210902191100991.jpg 20210902191107340.jpg	20210902_191038_A.igm	2021_09_02_19_10_41_R_05 TA=24.2;TB=44.4;Gain=3	
6	19:19:22	2968	107	20210902191928464.jpg 20210902191934828.jpg 20210902191942082.jpg 20210902191948446.jpg 20210902191954795.jpg 20210902192001143.jpg	20210902_191925_A.igm	2021_09_02_19_19_29_R_06 TA=29.1;TB=49.2;Gain=3	
7	19:28:16	2971	105	20210902192823176.jpg 20210902192829541.jpg 20210902192835889.jpg 20210902192842254.jpg 20210902192848602.jpg	20210902_192819_A.igm	2021_09_02_19_28_23_R_07 TA=31.4;TB=51.4;Gain=3	
8	19:38:51	2906	104	20210902193856857.jpg 20210902193904126.jpg 20210902193910475.jpg 20210902193916824.jpg 20210902193923188.jpg	20210902_193853_A.igm	2021_09_02_19_38_58_R_08 TA=30.2;TB=50.0;Gain=3	
9	20:02:54	2916	106	20210902200300337.jpg 20210902200306702.jpg 20210902200313051.jpg 20210902200319415.jpg 20210902200325764.jpg 20210902200333033.jpg	20210902_200257_A.igm	2021_09_02_20_03_01_R_09 TA=33.0;TB=52.8;Gain=3	
10	20:11:35	2921	106	20210902201141464.jpg 20210902201147813.jpg 20210902201154162.jpg 20210902201200527.jpg	20210902_201138_A.igm	2021_09_02_20_11_42_R_10 TA=31.4;TB=51.5;Gain=3	
11	20:20:00	2919	105	20210902202006230.jpg 20210902202013499.jpg 20210902202019848.jpg	20210902_202004_A.igm	2021_09_02_20_20_07_R_11 TA=24.3;TB=44.5;Gain=3	

**Appendix B: Priority Sites Provided by EPA Region 6 & Louisiana Department of  
Environmental Quality**

<b>Facility_Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Parish</b>
Deltech LLC - Baton Rouge Facility	30.552892	-91.200536	East Baton Rouge
ExxonMobil Chemical Co - Baton Rouge Plastics Plant	30.551419	-91.175611	East Baton Rouge
ExxonMobil Baton Rouge Chemical Plant	30.484336	-91.169644	East Baton Rouge
Marathon Petroleum Co LP	30.068394	-90.596364	St. John the Baptist
Westlake Vinyls Co LP	30.209167	-91.017222	Ascension
Valero Refining - Meraux LLC - Meraux Refinery	29.930222	-89.944917	St. Bernard
Cornerstone Chemical Company	29.964722	-90.264722	Jefferson
Chalmette Refining LLC	29.937903	-89.969903	St. Bernard
ExxonMobil Chemical Company - Baton Rouge Chemicals North Plant	30.50465	-91.173219	East Baton Rouge
Equilon Enterprises LLC - Norco Refinery	29.995372	-90.410167	St. Charles
The Dow Chemical Company - Louisiana Operations	30.313927	-91.240586	Iberville
Rubicon LLC - Geismar Facility	30.20139	-91.01222	Ascension
BASF Corp - Geismar Site	30.18425	-91.002778	Ascension
Union Carbide Corp - St. Charles Plant	29.982289	-90.455622	St. Charles
Phillips 66 Co - Alliance Refinery	29.68406	-89.98145	Plaquemines
Axiall LLC - Plaquemine Facility	30.267167	-91.184258	Iberville
ExxonMobil Fuels & Lubricants Co - Baton Rouge Refinery	30.484392	-91.169444	East Baton Rouge
Equilon Enterprises LLC dba Shell Oil Products US - Convent Refinery	30.107684	-90.890796	St. James
Marathon Petroleum Company LP - Louisiana Refining Division - Garyville Refinery	30.061322	-90.593528	St. John the Baptist
BASF Corp - Zachary Site	29.547603	-90.523231	East Baton Rouge
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188	Ascension
St Rose Refinery LLC - St Rose Refinery	29.950875	-90.328497	St. Charles
ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant	30.56215	-91.20387	East Baton Rouge
Shell Chemical LP - Norco Chemical Plant West Site	30.004925	-90.422381	St. Charles
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884	Ascension
Roehm America LLC - MMA Plant	29.9575	-90.265833	Jefferson
Valero Refining - New Orleans LLC - St Charles Refinery	29.985781	-90.3955	St. Charles
Shell Chemical LP - Norco Chemical Plant - East Site	29.995556	-90.409722	St. Charles
BASF Corp - North Geismar Site	30.20594	-90.99195	Ascension

Stolthaven New Orleans, LLC - Braithwaite Facility	29.870919	-89.949339	Plaquemines
Shintech Louisiana LLC - Shintech Plaquemine Plant	30.273611	-91.173333	Iberville
Denka Performance Elastomer LLC	30.053928	-90.524792	St. John the Baptist
Formosa Plastics Corp Louisiana	30.501722	-91.185944	East Baton Rouge
DuPont Specialty Products USA LLC - Pontchartrain Site	30.05388	-90.52472	St. John the Baptist
Occidental Chemical Corp - Taft Plant	29.987222	-90.454722	St. Charles
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508	Iberville
Mosaic Fertilizer LLC - Faustina Plant	30.083914	-90.91345	St. James
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275	St. James
LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333	Iberville
Occidental Chemical Corporation - Convent Facility	30.055885	-90.830594	St. James
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631	Iberville
Targa Midstream Services LLC	29.237034	-89.384977	Plaquemines
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389	Iberville
EnLink LIG Liquids LLC - Gibson Gas Processing Plant	29.643056	-90.961944	Terrebonne
NuStar Logistics LP - St James Terminal	30.030065	-90.843463	St. James
Enterprise Gas Processing LLC - Norco Fractionation Plant	30.015411	-90.402958	St. Charles
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833	Ascension
INEOS Oxide - A Division of INEOS Americas LLC	30.313889	-91.240278	Iberville
Discovery Producer Services LLC - Discovery Paradis Fractionation Plant	29.858889	-90.453333	St. Charles
Plains Marketing LP - St James Terminal	30.004341	-90.848449	St. James
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833	Ascension
Dyno Nobel LA Ammonia LLC - Ammonia Production Facility	29.964789	-90.264625	Jefferson
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792	Ascension
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819	St. James
YCI Methanol Plant	29.97481	-90.86775	St. James
IGP Methanol LLC - Gulf Coast Methanol Complex	29.625453	-89.926611	Plaquemines
KMe St James Holdings LLC - Methanol Terminal	29.990919	-90.841239	St. James
Kemira Chemicals Inc	29.964722	-90.264722	Jefferson
PHILLIPS 66 PIPELINE LLC	29.923889	-90.482498	St. Charles
CF INDUSTRIES	30.08328	-90.957665	Ascension

## Appendix C: ASPECT Systems

The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 3,000 ft AGL). The system consists of an airborne high-speed Fourier Transform Infra-Red (FTIR) spectrometer coupled with a wide-area IR Line Scanner (IRLS). The ASPECT IR systems can detect chemical compounds in both the 8-to-12-micron (800 to 1200  $\text{cm}^{-1}$ ) and 3 to 5 micron (2000 to 3200  $\text{cm}^{-1}$ ) regions. List of chemicals and detection limits are listed in Table 1. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon - non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The carbon - hydrogen stretch is very common in this region.

An Imperx mapping camera (29 mega pixels; mapping focal plane array) is concurrently operated as part of all chemical collections. These images are often digitally processed in lower resolution, so they can be transmitted via satellite communication. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while in flight or approximately 600 frames per hour can be processed once the data are downloaded from the aircraft. The high-resolution images (>20 MB each) are pulled from the ASPECT after the sortie and are available later.

All aerial photographic images collected by the ASPECT system are ortho-rectified and geospatially validated by the scientific reach back team. In general, this consists of conducting geo-registration using a USGS Digital Elevation Model (DEM) which promotes superior pixel computation and lessens topographic distortion. The image is checked by the team (using a Google Earth base map) for proper location and rotation.

Airborne radiological measurements are conducted using three fully integrated multi-crystal sodium iodide (NaI) RSX4 gamma ray spectrometers. Each RSX4 spectrometer contains four 4"x2"x16" doped NaI crystals each having an independent photomultiplier/spectrometer assembly. One RSX unit is configured with an additional upward NaI crystal utilized to provide real-time cosmic ray correction. Count and energy data from each crystal and pack is combined using a self-calibrating signal processor to generate a virtual detector output. All radiological spectrometer "packs" are further combined using a signal console controlled by the on-board central computer in the aircraft. Altitude correction data is provided by a radar altimeter with internal GPS systems within the packs serving as a backup. It should be noted that no radiological measurements were conducted on this mission.

Data is processed using automated algorithms onboard the aircraft with preliminary results being sent using a satellite system to the ASPECT scientific reach back team for QA/QC analysis. Upon landing, preliminary data results are examined and validated by the

scientific reach back team.



Table 1. ASPECT Automated Compounds

This table contains ASPECT's library of automated compounds.

Detection limits are for each chemical is found in parenthesis in units of parts per million (ppm)

Acetic Acid (2.0)	Cumene (23.1)	Isoprene (6.5)	Phosphine (8.3)
Acetone (5.6)	Diborane (5.0)	Isopropanol (8.5)	Phosphorus Oxychloride (2.0)
Acrolein (8.8)	1,1-Dichloroethene (3.7)	Isopropyl Acetate (0.7)	Propyl Acetate (0.7)
Acrylonitrile (12.5)	Dichloromethane (6.0)	MAPP (3.7)	Propylene (3.7)
Acrylic Acid (3.3)	Dichlorodifluoromethane (0.7)	Methyl Acetate (1.0)	Propylene Oxide (6.8)
Allyl Alcohol (5.3)	1,1-Difluoroethane (0.8)	Methyl Acrylate (1.0)	Silicon Tetrafluoride (0.2)
Ammonia (2.0)	Difluoromethane (0.8)	Methyl Ethyl Ketone (7.5)	Sulfur Dioxide (15)
Arsine (18.7)	Ethanol (6.3)	Methanol (5.4)	Sulfur Hexafluoride (0.07)
Bis-Chloroethyl Ether (1.7)	Ethyl Acetate (0.8)	Methylbromide (60)	Sulfur Mustard (6.0)
Boron Tribromide (0.2)	Ethyl Acrylate (0.8)	Methylene Chloride (1.1)	Sulfuryl Fluoride (1.5)
Boron Trifluoride (5.6)	Ethyl Formate (1.0)	Methyl Methacrylate (3.0)	Tetrachloroethylene (10)
1,3-Butadiene (5.0)	Ethylene (5.0)	MTEB (3.8)	1,1,1-Trichloroethane (1.9)
1-Butene (12.0)	Formic Acid (5.0)	Naphthalene (3.8)	Trichloroethylene (2.7)
2-Butene (18.8)	Freon 134a (0.8)	n-Butyl Acetate (3.8)	Trichloromethane (0.7)
Carbon Tetrachloride (0.2)	GA (Tabun) (0.7)	n-Butyl Alcohol (7.9)	Triethylamine (6.2)
Carbonyl Fluoride (0.8)	GB (Sarin) (0.5)	Nitric Acid (5.0)	Triethylphosphate (0.3)
Carbon Tetrafluoride (0.1)	Germane (1.5)	Nitrogen Mustard (2.5)	Trimethylamine (9.3)
Chlorodifluoromethane (0.6)	Hexafluoroacetone (0.4)	Nitrogen Trifluoride (0.7)	Trimethyl Phosphite (0.4)
Chloromethane (12)	Isobutylene (15)	Phosgene (0.5)	Vinyl Acetate (0.6)

Message

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**From:** Turville Rick [Rick.Turville@kalmancoinc.com]  
**Sent:** 9/4/2021 6:23:04 PM  
**To:** Taylor, Jillianne [Taylor.Jillianne@epa.gov]  
**CC:** mark [mark@spectralsystemsglobal.com]  
**Subject:** Draft report for 3 September 2021  
**Attachments:** ASPECT Summary - Hurricane Ida 3 September 2021.docx

Jill,

Please find attached a draft report for 3 Sept 2021. Mark is going to go back to fix some bugs he found in the report for 2 Sept. That will following shortly.

R/ Rick

# Airborne Spectral Photometric Environmental Collection Technology

## ASPECT Air Quality Survey Baton Rouge, LA. 2 September 2021



### ASPECT Mission Supporting:

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On-Scene Coordinator  
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CBRN CMAD FOB Branch Chief  
Argenta.Edward@EPA.gov  
202-843-4511

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jpg	JPEG image format
kts	knots
mph	miles per hour
m/s	meters per second
MSIC	Digital photography file from the Imperx mapping camera
MSL	Mean Sea Level Altitude (in feet)
ppm	parts per million
UTC	Universal Time Coordinated

## **Executive Summary**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On September 2nd, 2021, the State of Louisiana requested ESF-10 assistance through FEMA and Region 6 asked for the ASPECT plane to be deployed in support of the response to Hurricane Ida. The state wanted assistance monitoring facility emissions in the industrial area between Baton Rouge and New Orleans, where flaring is resulting in the visible emission of black smoke.

ASPECT was tasked to perform remote chemical sensing over target properties to screen for airborne chemicals and take high-resolution photos to provide situational awareness. Potential areas identified for monitoring included: East Baton Rouge, Ascension, Iberville, St. James, St. John, St. Charles, Jefferson, and Orleans. The system conducted one flight mission on 2 September 2021 including air monitoring survey collections over the target area with favorable weather conditions for all passes. Although two black plumes were visible over one of the sites, no major emissions were detected with the FTIR.

A continuation of the overall Baton Rouge facility survey was conducted on 3 September 2021. Two data collection flights were conducted which bracketed a Presidential temporary flight restriction not allowing any flight activity. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.

# **ASPECT Air Quality Survey**

## **Hurricane IDA**

### **Baton Rouge, LA**

### **3 September 2021**

#### **Background and Operational Overview**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On 2 September 2021, ASPECT was tasked to conduct a wide area air quality screening level assessment of areas populated with Risk Management Plan (RMP) sites and petrochemical facilities using the ASPECT system for detections of any airborne contaminants from ASPECT's 76 chemical detection library in the areas affected by Ida. The Region wanted to know if any detections were found, the location of the detection, and the concentration detected. Sites including Marathon Petroleum Company, Shell Norco Facility, and Phillips 66 pipeline site were surveyed. There were no chemical detections at the sites surveyed. Extremely slow satellite transmission speeds (possibly due to high bandwidth use by other first responders) resulted in long delays in data collection. Some chemical photos were pulled down during flight, with the majority needing to be pulled down with a more high-speed internet connection on the ground.

ASPECT was tasked with a continuation of the general Baton Rouge area survey and conducted two flights on 3 September. Sites targeted for the 3 September 2021 survey are given in table 1. Due to a Presidential Temporary Flight restriction, flight 2 was cut short and was resumed later in the day as flight 3.

**Table 1. Sites Covered on 03 September 2021 Flights 3 and 4**

ExxonMobil Baton Rouge Chemical Plant	30.484336	-91.169644
Formosa Plastics Corp Louisiana	30.501722	-91.185944
ExxonMobil Chemical Company - Baton Rouge Chemicals North Plant	30.50465	-91.173219
The Dow Chemical Company - Louisiana Operations	30.313927	-91.240586

Axiall LLC - Plaquemine Facility	30.267167	-91.184258
ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant	30.56215	-91.20387
INEOS Oxide - A Division of INEOS Americas LLC	30.313889	-91.240278
Shintech Louisiana LLC - Shintech Plaquemine Plant	30.273611	-91.173333

## General Mission Objectives

Once granted access to fly over the sites, the following general mission objectives were employed in conducting data collection with ASPECT:

1. To capture an overall, situational awareness of the incident using aerial photography with:
  - Oblique camera—photos taken by hand from the view/position of the co-pilot, and
  - MSIC photos—advanced camera mounted underneath the plane for a top-down view of the designated sites.
2. To qualitatively locate and characterize any the visible and non-visible components of a plume, as well as any areas on fire:
  - Using the Infrared Line Scanner (IRLS)
3. To screen for the presence and location of specific chemicals within ASPECT's automated chemical detection library:
  - Using the Fourier Transform Infrared (FTIR) Spectrometer

## Flight Conditions and Status

### Weather and Site Conditions

Prior to each flight, an updated status of the current and forecasted weather, site conditions and any potential flight obstacles including radio towers impacting safety is assessed by the crew. A summary of the ground weather conditions during the missions can be found in Table 2 and 3.

**Table 2. Ground Weather for Baton Rouge, LA, Flight 3  
3 September 2021**

Time	1253	1353	1453	1553	1653
Wind direction	0 degrees	0 degrees N	0 degrees	0 degrees N	0 degrees N
Wind speed	1.3 m/s (3.0 mph)	2.2 m/s (5.0 mph)	0.0 m/s (0.0 mph)	2.7 m/s (6.0 mph)	3.1 m/s (7.0 mph)
Temperature	31.7 C	31.7 C	32.2 C	32.2 C	32.2 C
Relative humidity	59	61	60	58	56
Dew point	22.8 C	23.3 C	23.3 C	22.8 C	22.2 C
Pressure	1014.6 mb	1014.3 mb	1013.3 mb	1012.6 mb	1012.3 mb
Ceiling	Scattered 5000 Ft	Scattered 4000 Ft	Few 4200 Ft	Clear	Clear



**Table 2. Ground Weather for Baton Rouge, LA, Flight 4  
3 September 2021**

Time	1653	1753	1853	1953	2053
Wind direction	0 degrees N	22.5 degrees NNE	45 degrees NE	45 degrees NE	0 degrees N
Wind speed	3.1 m/s (7.0 mph)	2.2 m/s (5.0 mph)	2.7 m/s (6.0 mph)	1.3 m/s (3.0 mph)	0.4 m/s (1.0 mph)
Temperature	32.2 C	31.7 C	29.4 C	27.8 C	26.1 C
Relative humidity	56	59	68	74	88
Dew point	22.2 C	22.8 C	22.8 C	22.8 C	23.9 C
Pressure	1012.3 mb	1012.3 mb	1012.6 mb	1012.6 mb	1012.9 mb
Ceiling	Clear	Clear	Clear	Clear	Clear

### **Data Results**

The following data is provided as a summary analysis. All data products are available for the Region to access on a shared FTP site. For a complete list of available products, see Appendix A. The data collected during these missions included a flight path summary, IRLS images, FTIR chemical identification and quantification, high resolution MSIC photos, and oblique photos.

### Flight Paths

Wide, slow turns are required to be made in between runs to keep the instruments stable. The blue lines indicate the flight path while the green lines indicate the specific sections of the flight where chemical data was collected and processed. On Flight 1 the Baton Rouge area was surveyed, and the flight path is shown in Figure 1.



### Line Scanner Data Results

A total of 14 data collection runs (2 system checks and 12 data runs) were made over the Baton Rouge area and during each collection run an infrared line scanner image was generated. Figure 3 shows a 3-band infrared image collected over a facility collected as part of flight 3. Minimum elevated thermal information is present in the image indicating little activity at the facility. Figure 4 shows a similar image collected on flight 4 with flare signatures present on the northern portion of the facility. No chemical plumes can be observed being emitted from the facility.

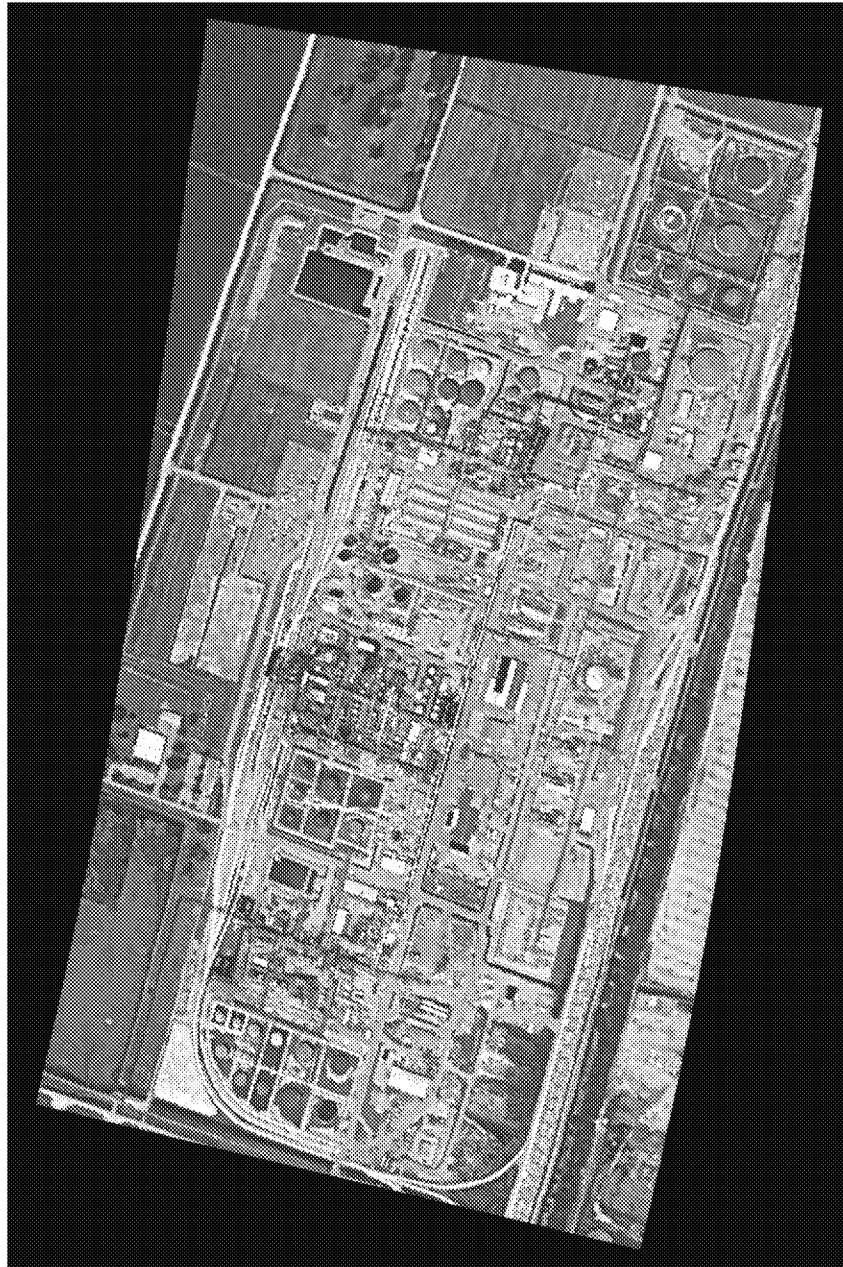


Figure 3. Three band IR image, Baton Rouge Area, Run 2, Flight 3, 3 September 2021

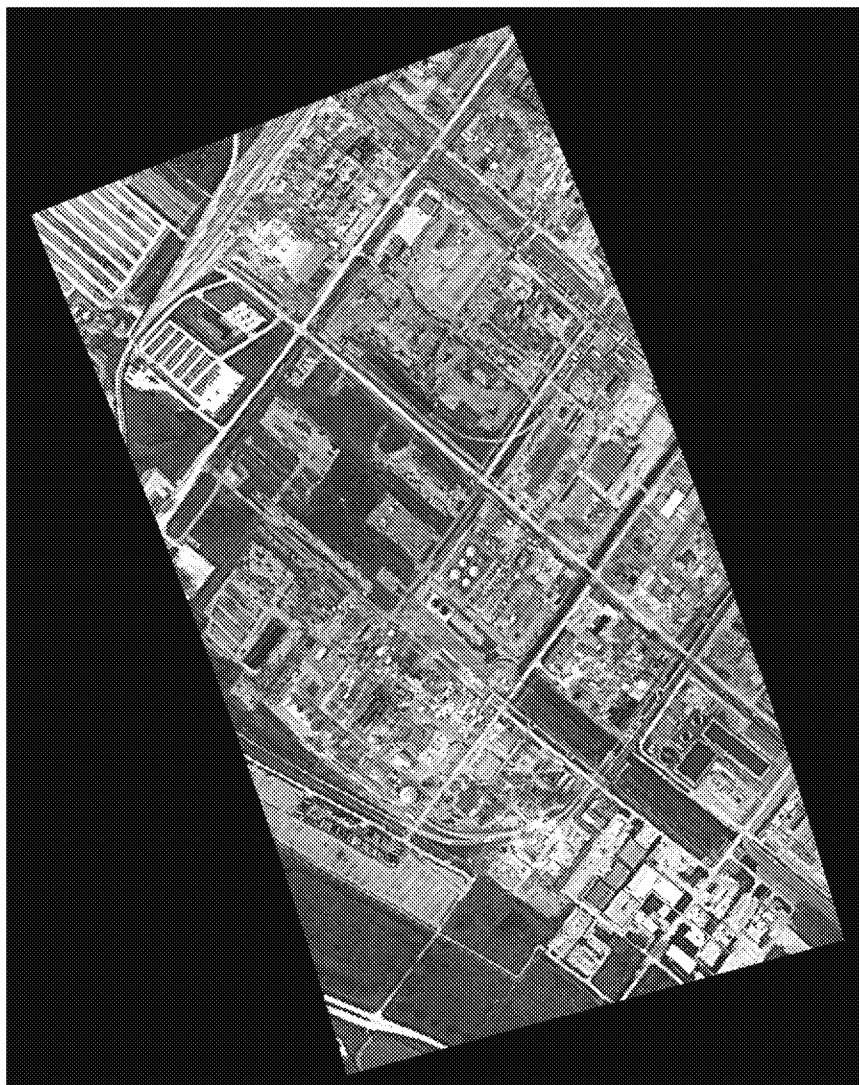


Figure 4. Three band IR image, Baton Rouge Area, Run 2, Flight 4, 3 September 2021

### FTIR Data Results

FTIR spectral data at a resolution of 16 wavenumbers was collected for each run. ASPECT uses an automated detection algorithm to permit compounds to be automatically analyzed while the aircraft is in flight. Seventy-six chemical compounds are included in the airborne algorithm library (the list is provided in Appendix B, Table 1). In addition, collected data was also manually quality checked against a collection of published library spectra for each chemical detected.

ASPECT did not detect any programmed compounds (those found in Appendix B, Table 1) as part of the mission over the Baton Rouge areas on the two flights conducted on 3 September 2021. Details of the monitoring results can be found in Table 3 and 4.

**Table 3. Chemical Results Summary  
Baton Rouge Collection Area, Flight 3**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
1	2021-09-03	18:40:38	ND	ND
2		19:28:07	ND	ND
3		19:37:29	ND	ND
4		19:47:36	ND	ND
5		19:58:57	ND	ND
6		20:09:07	ND	ND

**Table 4. Chemical Results Summary  
Baton Rouge Collection Area, Flight 4**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
1	2021-09-03	22:42:44	ND	ND
2		22:52:25	ND	ND
3		23:11:57	ND	ND
4		23:24:41	ND	ND
5		23:39:47	ND	ND
6		23:47:06	ND	ND
7		00:00:47	ND	ND
8		00:09:49	ND	ND

#### Aerial Photography Results

A full set of high-resolution aerial digital photography were collected as part of each data collection pass. Weather conditions over the Baton Rouge allowed high quality aerial images to be collected. Figures 4 shows an aerial image of part of the tank farm over the Exxon Chemical facility near Baton Rouge. It is noted that little water is present in the secondary containment structures. Figure 5 shows representative oblique image of the Westlake Plaquemine facility collected during flight 3. Some activity is present at the facility as evident by the steam plume being released from a process unit.

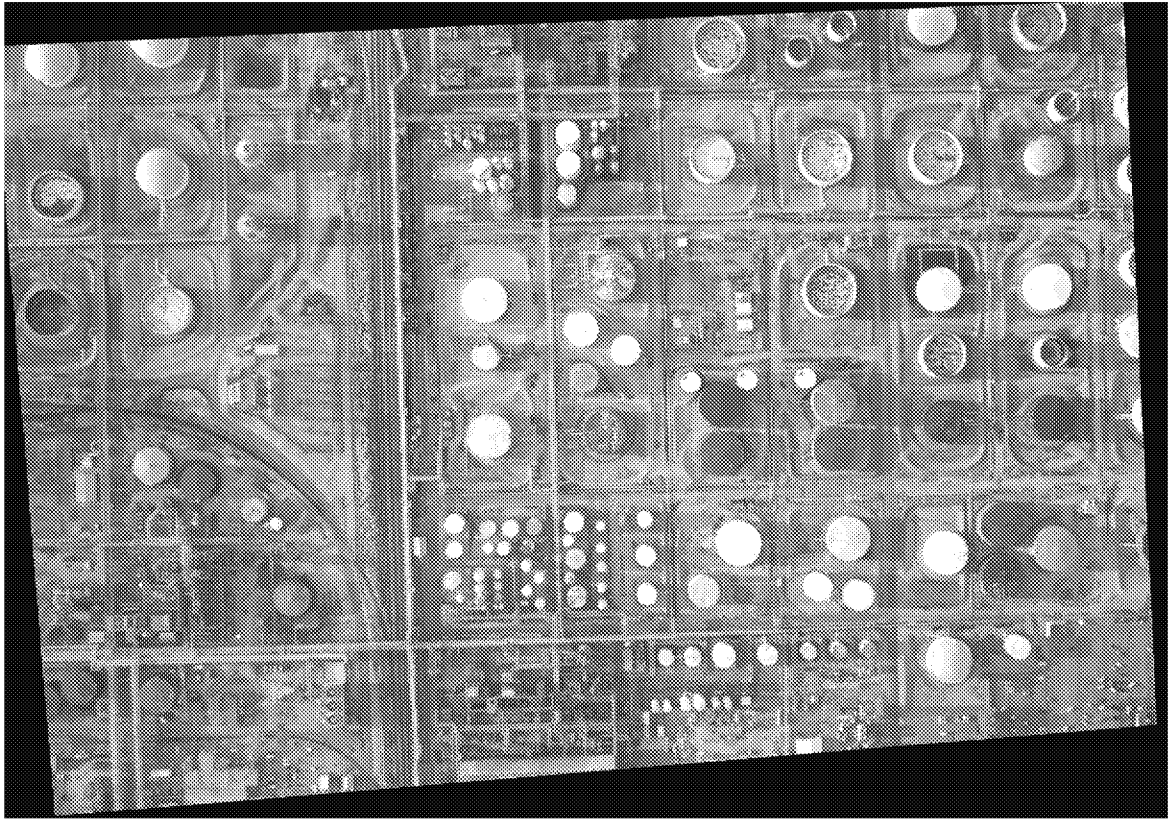


Figure 5. MSIC photo taken over the Exxon Chemical Facility in Baton Rouge, LA on 03 September 2021



Figure 6. Oblique photo taken over the Shintech Plaquemine Facility as part of Flight 3, 02 September 2021

## **Conclusion**

Two data collection flights were conducted on 3 September 2021 as part of the overall Baton Rouge collection area. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.



## Appendix A: File Names of Data Collected During Flight

### Baton Rouge Collection Areas, Flight 3, 3 September 2021

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files
1	18:40:38	2877	119	20210903184044277.jpg 20210903184050635.jpg 20210903184057000.jpg	20210903_184041_A.igm	2021_09_03_18_40_43_R_01 TA=29.0;TB=49.2;Gain=3
2	19:28:07	2930	110	20210903192813180.jpg 20210903192819531.jpg 20210903192825896.jpg 20210903192832242.jpg 20210903192839510.jpg 20210903192845874.jpg	20210903_192810_A.igm	2021_09_03_19_28_12_R_02 TA=29.1;TB=49.3;Gain=3
3	19:37:29	2839	104	20210903193734248.jpg 20210903193741518.jpg 20210903193747867.jpg 20210903193754236.jpg 20210903193800578.jpg	20210903_193732_A.igm	2021_09_03_19_37_33_R_03 TA=29.2;TB=49.0;Gain=3
4	19:47:36	2899	109	20210903194742537.jpg 20210903194749801.jpg 20210903194756150.jpg 20210903194802499.jpg 20210903194808864.jpg 20210903194815213.jpg 20210903194821577.jpg 20210903194827921.jpg	20210903_194740_A.igm 20210903_194819_A.igm	2021_09_03_19_47_41_R_04 TA=29.4;TB=49.6;Gain=3
5	19:58:57	2861	107	20210903195903436.jpg 20210903195909802.jpg 20210903195916151.jpg 20210903195922510.jpg 20210903195928859.jpg 20210903195935223.jpg	20210903_195901_A.igm	2021_09_03_19_59_02_R_05 TA=28.8;TB=48.9;Gain=3
6	20:09:07	2890	110	20210903200913550.jpg 20210903200919899.jpg 20210903200926248.jpg 20210903200933507.jpg 20210903200939865.jpg 20210903200946223.jpg 20210903200952588.jpg 20210903200958938.jpg	20210903_200911_A.igm 20210903_200950_A.igm	2021_09_03_20_09_13_R_06 TA=28.7;TB=48.5;Gain=3

### Baton Rouge Collection Areas, Flight 4, 3 September 2021

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files
1	22:42:44	2812	104	20210903224250825.jpg 20210903224257175.jpg 20210903224303540.jpg 20210903224309890.jpg 20210903224316239.jpg 20210903224323508.jpg 20210903224329856.jpg 20210903224336220.jpg	20210903_224248_A.igm 20210903_224327_A.igm	2021_09_03_22_42_48_R_01 TA=30.0;TB=50.3;Gain=3
2	22:52:25	2876	109	20210903225230958.jpg 20210903225237307.jpg 20210903225244562.jpg 20210903225250927.jpg 20210903225257277.jpg 20210903225303629.jpg	20210903_225228_A.igm	2021_09_03_22_52_29_R_02 TA=25.5;TB=45.7;Gain=3
3	23:11:57	2883	110	20210903231203019.jpg 20210903231209368.jpg 20210903231215732.jpg	20210903_231200_A.igm 20210903_231240_A.igm	2021_09_03_23_12_01_R_03 TA=26.0;TB=46.0;Gain=3



				20210903231222987.jpg 20210903231229336.jpg 20210903231235701.jpg 20210903231242051.jpg 20210903231248416.jpg 20210903231254766.jpg 20210903231301115.jpg 20210903231307480.jpg 20210903231313830.jpg		
4	23:24:41	2893	110	20210903232447457.jpg 20210903232453806.jpg 20210903232501076.jpg 20210903232507426.jpg 20210903232513775.jpg 20210903232520141.jpg 20210903232526490.jpg 20210903232532839.jpg 20210903232539205.jpg 20210903232545554.jpg	20210903_232445_A.igm 20210903_232525_A.igm	2021_09_03_23_24_46_R_04 TA=25.5;TB=45.4;Gain=3
5	23:39:47	2903	105	20210903233953519.jpg 20210903233959869.jpg 20210903234006233.jpg 20210903234012583.jpg 20210903234018933.jpg 20210903234026203.jpg 20210903234032552.jpg 20210903234038917.jpg	20210903_233950_A.igm 20210903_234030_A.igm	2021_09_03_23_39_52_R_05 TA=24.8;TB=44.8;Gain=3
6	23:47:06	2896	112	20210903234712935.jpg 20210903234719285.jpg 20210903234725634.jpg 20210903234731999.jpg 20210903234738349.jpg 20210903234744698.jpg	20210903_234709_A.igm	2021_09_03_23_47_11_R_06 TA=22.8;TB=41.9;Gain=3
7	00:00:47	2885	106	20210904000052757.jpg 20210904000100011.jpg 20210904000106376.jpg 20210904000112723.jpg 20210904000119072.jpg 20210904000125438.jpg 20210904000131787.jpg 20210904000138147.jpg	20210904_000052_A.igm 20210904_000129_A.igm	2021_09_04_00_00_52_R_07 TA=21.7;TB=42.3;Gain=3
8	00:09:49	2915	106	20210904000955663.jpg 20210904001002027.jpg 20210904001008377.jpg 20210904001014727.jpg 20210904001021093.jpg 20210904001027442.jpg	20210904_000952_A.igm	2021_09_04_00_09_54_R_08 TA=20.9;TB=41.0;Gain=3

**Appendix B: Priority Sites Provided by EPA Region 6 & Louisiana Department of  
Environmental Quality**

<b>Facility_Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Parish</b>
Deltech LLC - Baton Rouge Facility	30.552892	-91.200536	East Baton Rouge
ExxonMobil Chemical Co - Baton Rouge Plastics Plant	30.551419	-91.175611	East Baton Rouge
ExxonMobil Baton Rouge Chemical Plant	30.484336	-91.169644	East Baton Rouge
Marathon Petroleum Co LP	30.068394	-90.596364	St. John the Baptist
Westlake Vinyls Co LP	30.209167	-91.017222	Ascension
Valero Refining - Meraux LLC - Meraux Refinery	29.930222	-89.944917	St. Bernard
Cornerstone Chemical Company	29.964722	-90.264722	Jefferson
Chalmette Refining LLC	29.937903	-89.969903	St. Bernard
ExxonMobil Chemical Company - Baton Rouge Chemicals North Plant	30.50465	-91.173219	East Baton Rouge
Equilon Enterprises LLC - Norco Refinery	29.995372	-90.410167	St. Charles
The Dow Chemical Company - Louisiana Operations	30.313927	-91.240586	Iberville
Rubicon LLC - Geismar Facility	30.20139	-91.01222	Ascension
BASF Corp - Geismar Site	30.18425	-91.002778	Ascension
Union Carbide Corp - St. Charles Plant	29.982289	-90.455622	St. Charles
Phillips 66 Co - Alliance Refinery	29.68406	-89.98145	Plaquemines
Axiall LLC - Plaquemine Facility	30.267167	-91.184258	Iberville
ExxonMobil Fuels & Lubricants Co - Baton Rouge Refinery	30.484392	-91.169444	East Baton Rouge
Equilon Enterprises LLC dba Shell Oil Products US - Convent Refinery	30.107684	-90.890796	St. James
Marathon Petroleum Company LP - Louisiana Refining Division - Garyville Refinery	30.061322	-90.593528	St. John the Baptist
BASF Corp - Zachary Site	29.547603	-90.523231	East Baton Rouge
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188	Ascension
St Rose Refinery LLC - St Rose Refinery	29.950875	-90.328497	St. Charles
ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant	30.56215	-91.20387	East Baton Rouge
Shell Chemical LP - Norco Chemical Plant West Site	30.004925	-90.422381	St. Charles
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884	Ascension
Roehm America LLC - MMA Plant	29.9575	-90.265833	Jefferson
Valero Refining - New Orleans LLC - St Charles Refinery	29.985781	-90.3955	St. Charles
Shell Chemical LP - Norco Chemical Plant - East Site	29.995556	-90.409722	St. Charles
BASF Corp - North Geismar Site	30.20594	-90.99195	Ascension
Stolthaven New Orleans, LLC - Braithwaite Facility	29.870919	-89.949339	Plaquemines

Shintech Louisiana LLC - Shintech Plaquemine Plant	30.273611	-91.173333	Iberville
Denka Performance Elastomer LLC	30.053928	-90.524792	St. John the Baptist
Formosa Plastics Corp Louisiana	30.501722	-91.185944	East Baton Rouge
DuPont Specialty Products USA LLC - Pontchartrain Site	30.05388	-90.52472	St. John the Baptist
Occidental Chemical Corp - Taft Plant	29.987222	-90.454722	St. Charles
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508	Iberville
Mosaic Fertilizer LLC - Faustina Plant	30.083914	-90.91345	St. James
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275	St. James
LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333	Iberville
Occidental Chemical Corporation - Convent Facility	30.055885	-90.830594	St. James
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631	Iberville
Targa Midstream Services LLC	29.237034	-89.384977	Plaquemines
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389	Iberville
EnLink LIG Liquids LLC - Gibson Gas Processing Plant	29.643056	-90.961944	Terrebonne
NuStar Logistics LP - St James Terminal	30.030065	-90.843463	St. James
Enterprise Gas Processing LLC - Norco Fractionation Plant	30.015411	-90.402958	St. Charles
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833	Ascension
INEOS Oxide - A Division of INEOS Americas LLC	30.313889	-91.240278	Iberville
Discovery Producer Services LLC - Discovery Paradis Fractionation Plant	29.858889	-90.453333	St. Charles
Plains Marketing LP - St James Terminal	30.004341	-90.848449	St. James
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833	Ascension
Dyno Nobel LA Ammonia LLC - Ammonia Production Facility	29.964789	-90.264625	Jefferson
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792	Ascension
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819	St. James
YCI Methanol Plant	29.97481	-90.86775	St. James
IGP Methanol LLC - Gulf Coast Methanol Complex	29.625453	-89.926611	Plaquemines
KMe St James Holdings LLC - Methanol Terminal	29.990919	-90.841239	St. James
Kemira Chemicals Inc	29.964722	-90.264722	Jefferson
PHILLIPS 66 PIPELINE LLC	29.923889	-90.482498	St. Charles
CF INDUSTRIES	30.08328	-90.957665	Ascension

## Appendix C: ASPECT Systems

The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 3,000 ft AGL). The system consists of an airborne high-speed Fourier Transform Infra-Red (FTIR) spectrometer coupled with a wide-area IR Line Scanner (IRLS). The ASPECT IR systems can detect chemical compounds in both the 8-to-12-micron (800 to 1200  $\text{cm}^{-1}$ ) and 3 to 5 micron (2000 to 3200  $\text{cm}^{-1}$ ) regions. List of chemicals and detection limits are listed in Table 1. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon - non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The carbon - hydrogen stretch is very common in this region.

An Imperx mapping camera (29 mega pixels; mapping focal plane array) is concurrently operated as part of all chemical collections. These images are often digitally processed in lower resolution, so they can be transmitted via satellite communication. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while in flight or approximately 600 frames per hour can be processed once the data are downloaded from the aircraft. The high-resolution images (>20 MB each) are pulled from the ASPECT after the sortie and are available later.

All aerial photographic images collected by the ASPECT system are ortho-rectified and geospatially validated by the scientific reach back team. In general, this consists of conducting geo-registration using a USGS Digital Elevation Model (DEM) which promotes superior pixel computation and lessens topographic distortion. The image is checked by the team (using a Google Earth base map) for proper location and rotation.

Airborne radiological measurements are conducted using three fully integrated multi-crystal sodium iodide (NaI) RSX4 gamma ray spectrometers. Each RSX4 spectrometer contains four 4"x2"x16" doped NaI crystals each having an independent photomultiplier/spectrometer assembly. One RSX unit is configured with an additional upward NaI crystal utilized to provide real-time cosmic ray correction. Count and energy data from each crystal and pack is combined using a self-calibrating signal processor to generate a virtual detector output. All radiological spectrometer "packs" are further combined using a signal console controlled by the on-board central computer in the aircraft. Altitude correction data is provided by a radar altimeter with internal GPS systems within the packs serving as a backup. It should be noted that no radiological measurements were conducted on this mission.

Data is processed using automated algorithms onboard the aircraft with preliminary results being sent using a satellite system to the ASPECT scientific reach back team for QA/QC analysis. Upon landing, preliminary data results are examined and validated by the

scientific reach back team.

Table 1. ASPECT Automated Compounds

This table contains ASPECT's library of automated compounds.

Detection limits are for each chemical is found in parenthesis in units of parts per million (ppm)

Acetic Acid (2.0)	Cumene (23.1)	Isoprene (6.5)	Phosphine (8.3)
Acetone (5.6)	Diborane (5.0)	Isopropanol (8.5)	Phosphorus Oxychloride (2.0)
Acrolein (8.8)	1,1-Dichloroethene (3.7)	Isopropyl Acetate (0.7)	Propyl Acetate (0.7)
Acrylonitrile (12.5)	Dichloromethane (6.0)	MAPP (3.7)	Propylene (3.7)
Acrylic Acid (3.3)	Dichlorodifluoromethane (0.7)	Methyl Acetate (1.0)	Propylene Oxide (6.8)
Allyl Alcohol (5.3)	1,1-Difluoroethane (0.8)	Methyl Acrylate (1.0)	Silicon Tetrafluoride (0.2)
Ammonia (2.0)	Difluoromethane (0.8)	Methyl Ethyl Ketone (7.5)	Sulfur Dioxide (15)
Arsine (18.7)	Ethanol (6.3)	Methanol (5.4)	Sulfur Hexafluoride (0.07)
Bis-Chloroethyl Ether (1.7)	Ethyl Acetate (0.8)	Methylbromide (60)	Sulfur Mustard (6.0)
Boron Tribromide (0.2)	Ethyl Acrylate (0.8)	Methylene Chloride (1.1)	Sulfuryl Fluoride (1.5)
Boron Trifluoride (5.6)	Ethyl Formate (1.0)	Methyl Methacrylate (3.0)	Tetrachloroethylene (10)
1,3-Butadiene (5.0)	Ethylene (5.0)	MTEB (3.8)	1,1,1-Trichloroethane (1.9)
1-Butene (12.0)	Formic Acid (5.0)	Naphthalene (3.8)	Trichloroethylene (2.7)
2-Butene (18.8)	Freon 134a (0.8)	n-Butyl Acetate (3.8)	Trichloromethane (0.7)
Carbon Tetrachloride (0.2)	GA (Tabun) (0.7)	n-Butyl Alcohol (7.9)	Triethylamine (6.2)
Carbonyl Fluoride (0.8)	GB (Sarin) (0.5)	Nitric Acid (5.0)	Triethylphosphate (0.3)
Carbon Tetrafluoride (0.1)	Germane (1.5)	Nitrogen Mustard (2.5)	Trimethylamine (9.3)
Chlorodifluoromethane (0.6)	Hexafluoroacetone (0.4)	Nitrogen Trifluoride (0.7)	Trimethyl Phosphite (0.4)
Chloromethane (12)	Isobutylene (15)	Phosgene (0.5)	Vinyl Acetate (0.6)

Message

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**From:** Turville Rick [Rick.Turville@kalmancoinc.com]  
**Sent:** 9/5/2021 12:33:13 PM  
**To:** Taylor, Jillianne [Taylor.Jillianne@epa.gov]  
**CC:** mark [mark@spectralsystemsglobal.com]  
**Subject:** ASPECT report for 4 Sept 2021  
**Attachments:** ASPECT Summary - Hurricane Ida 4 September 2021 (flight 5 only).docx

Jill,

Please find attached the draft report for 4 September 2021. Please note that this report is only for flight 5. Flight 6 data has not been transferred yet. We will work that data into this report once we get it and send out a revision.

Please let us know if you need any changes.

R/ Rick

# Airborne Spectral Photometric Environmental Collection Technology

## ASPECT Air Quality Survey Baton Rouge, LA. September 4, 2021



### ASPECT Mission Supporting:

Eric Delgado  
On-Scene Coordinator  
Delgado.Eric@epa.gov

### Initial Mission Request

Brian Fontenot  
Louisiana Department of Environmental  
Quality

### ASPECT TEAM

Jill Taylor  
Chemical/Photometric Lead  
Taylor.Jillianne@EPA.gov  
214-406-9896

Tony Honnellio  
Radiological Lead (Detail)  
Honnellio.Anthony@EPA.gov  
617 947-4414

Ed Argenta  
CBRN CMAD FOB Branch Chief  
Argenta.Edward@EPA.gov  
202-843-4511



## Table of Contents

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## **Acronyms and Abbreviations**

Alt	Altitude (in feet)
AGL	Above Ground Level
cm	centimeter
CDT	Central Daylight Time
DEM	Digital Elevation Model
ESF-10	Emergency Support Function #10 – Oil and Hazardous Materials Response
FEMA	Federal Emergency Management Agency
ft	feet
FTIR	Fourier Transform Infrared Spectrometer
FTP	File Transfer Protocol
igm	Spectral data format based on grams format
IR	Infrared
IRLS	Infrared Line Scanner
jpg	JPEG image format
kts	knots
mph	miles per hour
m/s	meters per second
MSIC	Digital photography file from the Imperx mapping camera
MSL	Mean Sea Level Altitude (in feet)
PAN	peroxyacetyl nitrate
Ppm	parts per million
RMP	Risk Management Plan

UTC

Universal Time Coordinated

## Executive Summary

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On September 2nd, 2021, the State of Louisiana requested ESF-10 assistance through FEMA and Region 6 asked for the ASPECT plane to be deployed in support of the response to Hurricane Ida. The state wanted assistance monitoring facility emissions in the industrial area between Baton Rouge and New Orleans, where flaring is resulting in the visible emission of black smoke.

ASPECT was tasked to perform remote chemical sensing over target properties to screen for airborne chemicals and take high-resolution photos to provide situational awareness. Potential areas identified for monitoring included: East Baton Rouge, Ascension, Iberville, St. James, St. John, St. Charles, Jefferson, and Orleans. The system conducted one flight mission on 2 September 2021 including air monitoring survey collections over the target area with favorable weather conditions for all passes. Although two black plumes were visible over one of the sites, no major emissions were detected with the FTIR.

A continuation of the overall Baton Rouge facility survey was conducted on 3 September 2021. Two data collection flights were conducted which bracketed a Presidential temporary flight restriction not allowing any flight activity. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.

Flight 5 and 6 were conducted as part of survey operations conducted on 4 September 2021. A total of 17 facilities were surveyed. (Note, due to an internet outage due to weather, flight 6 data was not transmitted at the time of the report preparation.) No compounds were detected other than levels of ozone and peroxyacetyl nitrate. Analysis of IR imagery indicated that some facilities are showing hot process units.

# **ASPECT Air Quality Survey**

## **Hurricane IDA**

### **Baton Rouge, LA**

### **3 September 2021**

#### **Background and Operational Overview**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On 2 September 2021, ASPECT was tasked to conduct a wide area air quality screening level assessment of areas populated with Risk Management Plan (RMP) sites and petrochemical facilities using the ASPECT system for detections of any airborne contaminants from ASPECT's 76 chemical detection library in the areas affected by Ida. The Region wanted to know if any detections were found, the location of the detection, and the concentration detected. Sites including Marathon Petroleum Company, Shell Norco Facility, and Phillips 66 pipeline site were surveyed. There were no chemical detections at the sites surveyed. Extremely slow satellite transmission speeds (possibly due to high bandwidth use by other first responders) resulted in long delays in data collection. Some chemical photos were pulled down during flight, with the majority needing to be pulled down with a more high-speed internet connection on the ground.

On 3 September 2021 ASPECT was tasked with a continuation of the general Baton Rouge area survey and conducted two flights. 8 locations in the Baton Rouge area were surveyed as part of two flights. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.

Flight 5 and 6 were conducted as part of survey operations conducted on 4 September 2021. Collectively, a total of 17 facilities were surveyed. (Note, due to an internet outage due to weather, flight 6 data has not been transmitted at this time.) That flight will be included in a follow-on report.

**Table 1. Sites Covered on 03 September 2021 Flights 5 and 6**

LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833
Westlake Vinyls Co LP	30.209167	-91.017222
Rubicon LLC - Geismar Facility	30.20139	-91.01222
BASF Corp - North Geismar Site	30.20594	-90.99195
BASF Corp - Geismar Site	30.18425	-91.002778
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188
CF INDUSTRIES	30.08328002	-90.957665
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275
NuStar Logistics LP - St James Terminal	30.030065	-90.843463

### **General Mission Objectives**

Once granted access to fly over the sites, the following general mission objectives were employed in conducting data collection with ASPECT:

1. To capture an overall, situational awareness of the incident using aerial photography with:
  - Oblique camera—photos taken by hand from the view/position of the co-pilot, and
  - MSIC photos—advanced camera mounted underneath the plane for a top-down view of the designated sites.
2. To qualitatively locate and characterize any the visible and non-visible components of a plume, as well as any areas on fire:
  - Using the Infrared Line Scanner (IRLS)
3. To screen for the presence and location of specific chemicals within ASPECT's automated chemical detection library:
  - Using the Fourier Transform Infrared (FTIR) Spectrometer

### **Flight Conditions and Status**

#### Weather and Site Conditions

Prior to each flight, an updated status of the current and forecasted weather, site conditions and any potential flight obstacles including radio towers impacting safety is assessed by the crew. A summary of the ground weather conditions during the missions can be found in Table 2.

**Table 2. Ground Weather for Baton Rouge, LA, Flight 5  
4 September 2021**

Time	953	1053	1153	1253	1353	1453
Wind direction	67.5 degrees ENE	112.5 degrees ESE	292.5 degrees WNW	315 degrees NW	0 degrees	0 degrees
Wind speed	1.3 m/s (3.0 mph)	2.2 m/s (5.0 mph)	2.2 m/s (5.0 mph)	2.2 m/s (5.0 mph)	2.7 m/s (6.0 mph)	1.3 m/s (3.0 mph)
Temperature	27.8 C	30.0 C	31.1 C	31.7 C	31.7 C	32.8 C
Relative humidity	74	70	66	61	61	56
Dew point	22.8 C	23.9 C	23.9 C	23.3 C	23.3 C	22.8 C
Pressure	1013.9 mb	1014.3 mb	1013.9 mb	1013.6 mb	1013.3 mb	1012.3 mb
Ceiling	Clear	Clear	Scattered 4200 Ft	Few 3900 Ft	Scattered 4200 Ft	Few 4600 Ft

## Data Results

The following data is provided as a summary analysis. All data products are available for the Region to access on a shared FTP site. For a complete list of available products, see Appendix A. The data collected during these missions included a flight path summary, IRLS images, FTIR chemical identification and quantification, high resolution MSIC photos, and oblique photos.

### Flight Paths

Wide, slow turns are required to be made in between runs to keep the instruments stable. The blue lines indicate the flight path while the green lines indicate the specific sections of the flight where chemical data was collected and processed. On Flight 1 the Baton Rouge area was surveyed, and the flight path is shown in Figure 1.



Figure 1. Data Collection Flight Path over the Baton Rouge Area Fight 5,  
4 September 2021

### Line Scanner Data Results

A total of 31 data collection runs were made over the target facilities and an infrared line scanner image was generated for each collection run. Figure 2 shows a 3-band infrared image collected over the CF Industries facility. Thermal analysis shows that many of the facilities are showing process units have some activity. The process unit located in the middle of figure 3 indicates hot units and hot piping. Other than thermal, no chemical plumes can be observed being emitted from the facility.



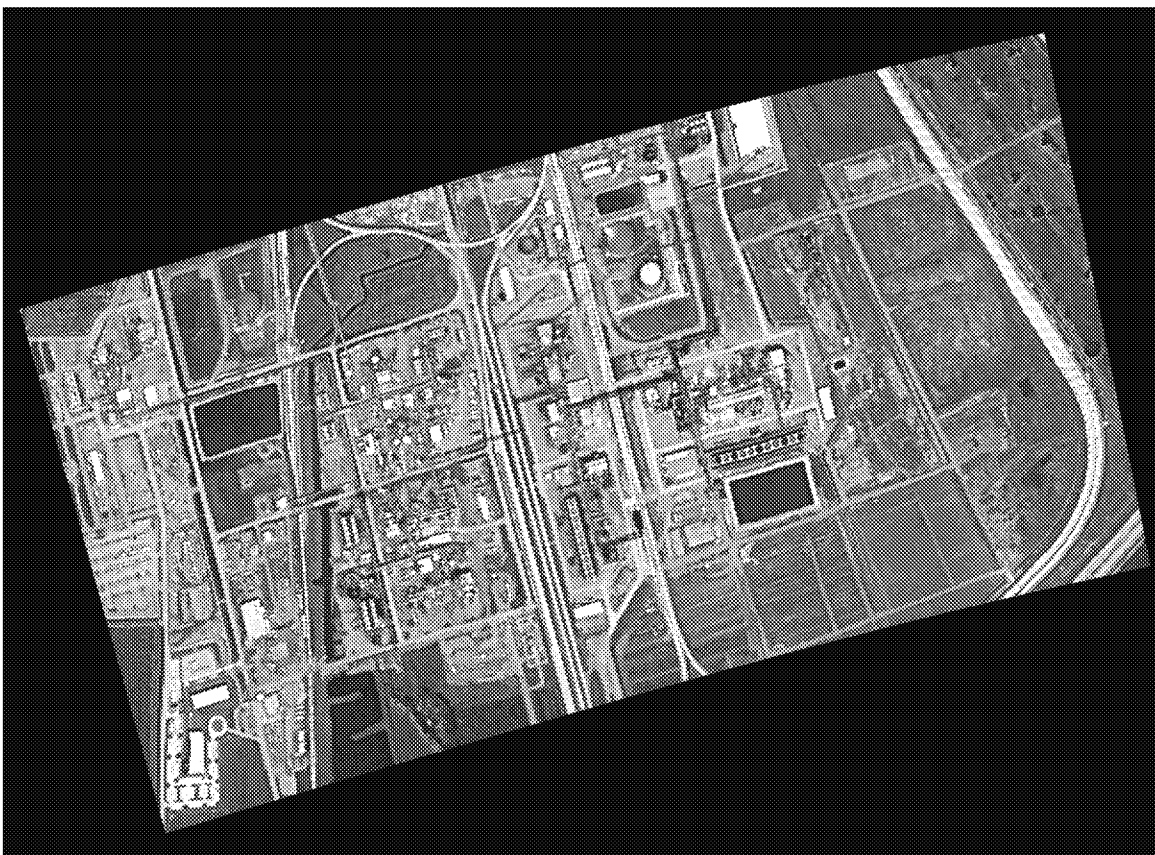


Figure 2. Three band IR image, Baton Rouge Area, Run 23, Flight 5, 4 September 2021

### FTIR Data Results

FTIR spectral data at a resolution of 16 wavenumbers was collected for each run. ASPECT uses an automated detection algorithm to permit compounds to be automatically analyzed while the aircraft is in flight. Seventy-six chemical compounds are included in the airborne algorithm library (the list is provided in Appendix B, Table 1). In addition, collected data was also manually quality checked against a collection of published library spectra for each chemical detected.

ASPECT did not detect any programmed compounds (those found in Appendix B, Table 1) as part of the mission over the Baton Rouge areas on the two flights conducted on 3 September 2021. Details of the monitoring results can be found in Table 3.

**Table 3. Chemical Results Summary  
Baton Rouge Collection Area, Flight 5**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
1	2021-09-04	14:13:50	Test	Test
2		15:01:22	ND	ND

3		15:12:15	ND	ND
4		15:24:47	ND	ND
5		15:32:46	ND	ND
6		15:42:23	ND	ND
7		15:51:20	ND	ND
8		16:02:17	ND	ND
9		16:09:39	ND	ND
10		16:18:48	ND	ND
11		16:27:35	ND	ND
12		16:35:25	ND	ND
13		16:45:24	ND	ND
14		16:52:56	ND	ND
15		17:07:25	ND	ND
16		17:18:42	ND	ND
17		17:28:17	ND	ND
18		17:34:43	ND	ND
19		17:49:52	ND	ND
20		17:56:26	ND	ND
21		18:08:41	ND	ND
22		18:15:49	ND	ND
23		18:21:56	ND	ND

### Aerial Photography Results

A full set of high-resolution aerial digital photography were collected as part of each data collection pass. Weather conditions over the Baton Rouge allowed high quality aerial images to be collected. Figures 3 shows a representative aerial image collected over the Syngenta Crop Protection facility. Figure 4 shows a representative oblique with evidence of plant activity due to the steam plume.

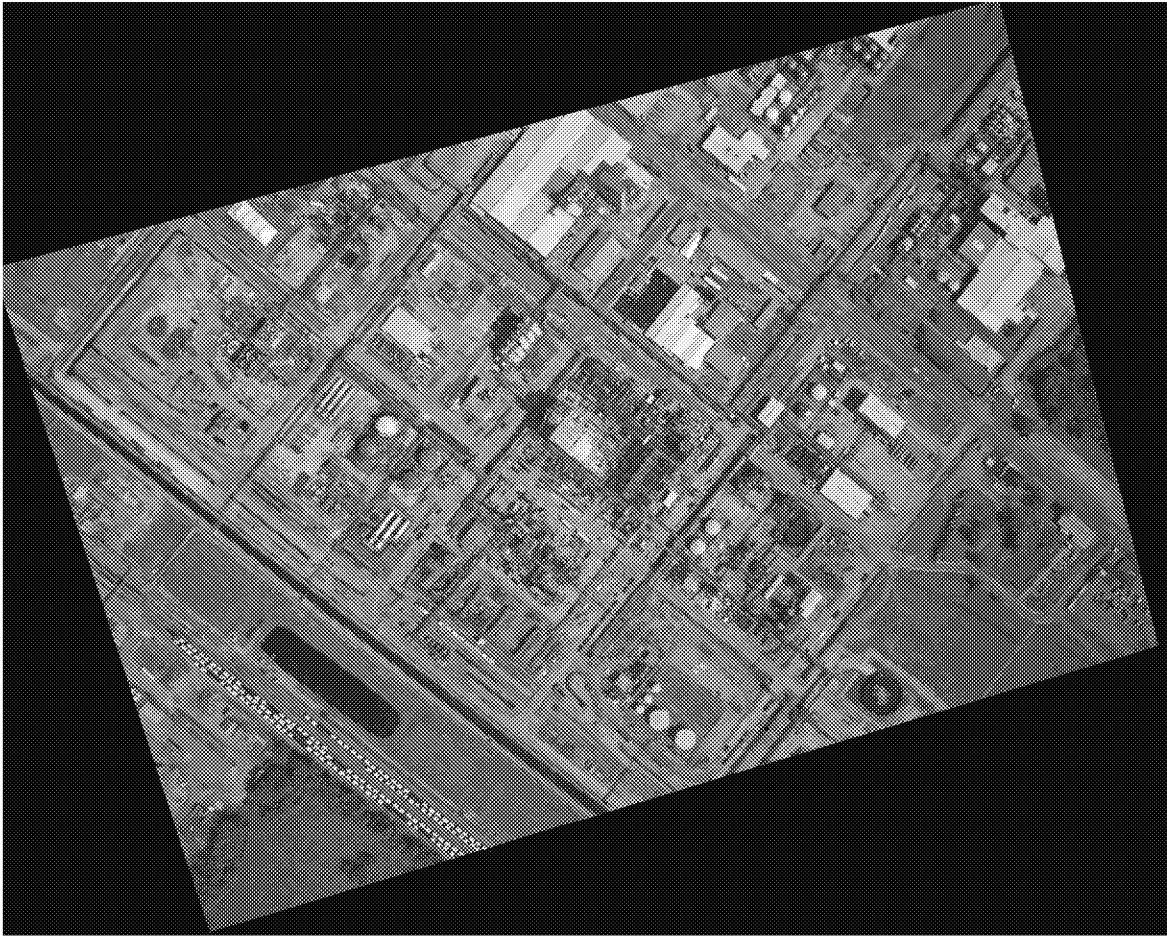


Figure 3. MSIC image of the Syngenta Crop Protection facility, Flight 5, 4 September 2021



Figure 6. Oblique photo taken over the TBD Facility as part of Flight 5, 4 September 2021

## Conclusion

Two data collection flights were conducted on 4 September 2021 focusing on facilities south of Baton Rouge. A total of 29 active data collection passes were made covering 17 facilities. Analysis of IR imagery indicated that some facilities are showing hot process units. No chemical plumes or compounds being detected.

It should be noted, due to an internet outage due to weather, flight 6 data have not been transmitted at this time.

## Appendix A: File Names of Data Collected During Flight

### Baton Rouge Collection Areas, Flight 5, 4 September 2021

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files	Gamma Files
1	14:13:50	5761	155	20210904141356969.jpg 20210904141403318.jpg 20210904141409674.jpg	20210904_141354_A.igm	2021_09_04_14_13_55_R_01 TA=20.6;TB=41.4;Gain=3	
2	15:01:22	2861	105	20210904150128661.jpg 20210904150135011.jpg 20210904150141375.jpg	20210904_150125_A.igm	2021_09_04_15_01_28_R_02 TA=22.5;TB=42.4;Gain=3	
3	15:12:15	2899	106	20210904151221430.jpg 20210904151227795.jpg 20210904151234138.jpg	20210904_151219_A.igm	2021_09_04_15_12_20_R_03 TA=24.9;TB=44.9;Gain=3	
4	15:24:47	2883	108	20210904152453167.jpg 20210904152459532.jpg 20210904152505881.jpg	20210904_152450_A.igm	2021_09_04_15_24_52_R_04 TA=25.0;TB=44.9;Gain=3	
5	15:32:46	2885	107	20210904153252537.jpg 20210904153258886.jpg 20210904153305250.jpg 20210904153312514.jpg	20210904_153249_A.igm	2021_09_04_15_32_52_R_05 TA=24.7;TB=44.9;Gain=3	
6	15:42:23	2904	105	20210904154229045.jpg 20210904154235410.jpg 20210904154241760.jpg 20210904154248110.jpg 20210904154254474.jpg 20210904154301728.jpg	20210904_154226_A.igm	2021_09_04_15_42_28_R_06 TA=26.1;TB=45.2;Gain=3	
7	15:51:20	2901	105	20210904155126521.jpg 20210904155132871.jpg 20210904155139231.jpg 20210904155145580.jpg 20210904155151945.jpg 20210904155158294.jpg	20210904_155123_A.igm	2021_09_04_15_51_25_R_07 TA=24.6;TB=44.7;Gain=3	
8	16:02:17	2891	110	20210904160222922.jpg 20210904160229287.jpg 20210904160235646.jpg 20210904160241995.jpg 20210904160249259.jpg	20210904_160220_A.igm	2021_09_04_16_02_22_R_08 TA=25.5;TB=45.4;Gain=3	
9	16:09:39	2926	105	20210904160945066.jpg 20210904160951431.jpg 20210904160958685.jpg 20210904161005049.jpg 20210904161011398.jpg 20210904161014122.jpg	20210904_160942_A.igm	2021_09_04_16_09_45_R_09 TA=26.2;TB=46.4;Gain=3	
10	16:18:48	2917	108	20210904161854355.jpg 20210904161900704.jpg 20210904161907054.jpg 20210904161913419.jpg 20210904161920673.jpg 20210904161927037.jpg	20210904_161851_A.igm	2021_09_04_16_18_54_R_10 TA=26.4;TB=46.4;Gain=3	
11	16:27:35	2931	107	20210904162741837.jpg 20210904162748186.jpg 20210904162754551.jpg 20210904162800900.jpg 20210904162807249.jpg 20210904162813614.jpg	20210904_162738_A.igm 20210904_162817_A.igm	2021_09_04_16_27_41_R_11 TA=26.3;TB=46.6;Gain=3	

				20210904162819963.jpg 20210904162826328.jpg			
12	16:35:25	2916	108	20210904163531214.jpg 20210904163537563.jpg 20210904163543928.jpg 20210904163551184.jpg 20210904163557549.jpg 20210904163603898.jpg 20210904163610263.jpg 20210904163616612.jpg	20210904_163528_A.igm 20210904_163608_A.igm	2021_09_04_16_35_31_R_12 TA=26.5;TB=46.6;Gain=3	
13	16:45:24	2914	114	20210904164531333.jpg 20210904164537688.jpg 20210904164544037.jpg	20210904_164527_A.igm	2021_09_04_16_45_30_R_13 TA=26.5;TB=46.6;Gain=3	
14	16:52:56	2877	109	20210904165302552.jpg 20210904165309821.jpg 20210904165316170.jpg 20210904165322535.jpg 20210904165328885.jpg	20210904_165300_A.igm	2021_09_04_16_53_02_R_14 TA=27.1;TB=47.3;Gain=3	
15	17:07:25	2888	107	20210904170731415.jpg 20210904170737764.jpg 20210904170744113.jpg 20210904170751383.jpg 20210904170757737.jpg 20210904170804102.jpg 20210904170810445.jpg 20210904170816810.jpg 20210904170823153.jpg 20210904170829518.jpg 20210904170835867.jpg 20210904170842232.jpg	20210904_170729_A.igm 20210904_170808_A.igm	2021_09_04_17_07_31_R_15 TA=26.7;TB=46.7;Gain=3	
16	17:18:42	2896	103	20210904171848705.jpg 20210904171855055.jpg 20210904171902324.jpg 20210904171908673.jpg 20210904171915023.jpg 20210904171921387.jpg 20210904171927737.jpg 20210904171934101.jpg 20210904171940451.jpg 20210904171946800.jpg 20210904171948625.jpg	20210904_171845_A.igm 20210904_171924_A.igm	2021_09_04_17_18_49_R_16 TA=32.7;TB=52.1;Gain=3	
17	17:28:17	2896	109	20210904172823395.jpg 20210904172829744.jpg 20210904172836109.jpg 20210904172842458.jpg 20210904172848823.jpg 20210904172856077.jpg 20210904172902442.jpg 20210904172908785.jpg	20210904_172820_A.igm 20210904_172859_A.igm	2021_09_04_17_28_23_R_17 TA=28.2;TB=48.3;Gain=3	
18	17:34:43	2872	100	20210904173449245.jpg 20210904173455610.jpg 20210904173501959.jpg 20210904173508324.jpg 20210904173514673.jpg 20210904173521943.jpg 20210904173528292.jpg 20210904173534651.jpg 20210904173541000.jpg	20210904_173446_A.igm 20210904_173525_A.igm	2021_09_04_17_34_49_R_18 TA=29.1;TB=49.0;Gain=3	
19	17:49:52	2912	124	20210904174958958.jpg 20210904175005323.jpg	20210904_174954_A.igm	2021_09_04_17_49_58_R_19 TA=31.1;TB=51.0;Gain=3	

				20210904175011672.jpg 20210904175018021.jpg			
20	17:56:26	2882	102	20210904175632080.jpg 20210904175638430.jpg 20210904175644794.jpg 20210904175651151.jpg 20210904175658405.jpg 20210904175704754.jpg 20210904175711119.jpg 20210904175717468.jpg 20210904175723832.jpg 20210904175730182.jpg	20210904_175629_A.igm 20210904_175709_A.igm	2021_09_04_17_56_32_R_20 TA=29.7;TB=49.6;Gain=3	
21	18:08:41	2901	99	20210904180847467.jpg 20210904180854731.jpg 20210904180901096.jpg 20210904180907445.jpg 20210904180913794.jpg 20210904180920159.jpg	20210904_180844_A.igm	2021_09_04_18_08_48_R_21 TA=28.3;TB=48.5;Gain=3	
22	18:15:49	2905	113	20210904181555083.jpg 20210904181601447.jpg 20210904181607797.jpg 20210904181614161.jpg 20210904181620511.jpg 20210904181627780.jpg	20210904_181551_A.igm	2021_09_04_18_15_55_R_22 TA=33.5;TB=53.6;Gain=3	
23	18:21:56	2896	114	20210904182201886.jpg 20210904182209140.jpg 20210904182215489.jpg 20210904182221854.jpg 20210904182228203.jpg 20210904182234568.jpg	20210904_182158_A.igm	2021_09_04_18_22_02_R_23 TA=33.4;TB=53.6;Gain=3	

### Baton Rouge Collection Areas, Flight 6, 4 September 2021

(waiting for data)

**Appendix B: Priority Sites Provided by EPA Region 6 & Louisiana Department of  
Environmental Quality**

<b>Facility_Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Parish</b>
Deltech LLC - Baton Rouge Facility	30.552892	-91.200536	East Baton Rouge
ExxonMobil Chemical Co - Baton Rouge Plastics Plant	30.551419	-91.175611	East Baton Rouge
ExxonMobil Baton Rouge Chemical Plant	30.484336	-91.169644	East Baton Rouge
Marathon Petroleum Co LP	30.068394	-90.596364	St. John the Baptist
Westlake Vinyls Co LP	30.209167	-91.017222	Ascension
Valero Refining - Meraux LLC - Meraux Refinery	29.930222	-89.944917	St. Bernard
Cornerstone Chemical Company	29.964722	-90.264722	Jefferson
Chalmette Refining LLC	29.937903	-89.969903	St. Bernard
ExxonMobil Chemical Company - Baton Rouge Chemicals North Plant	30.50465	-91.173219	East Baton Rouge
Equilon Enterprises LLC - Norco Refinery	29.995372	-90.410167	St. Charles
The Dow Chemical Company - Louisiana Operations	30.313927	-91.240586	Iberville
Rubicon LLC - Geismar Facility	30.20139	-91.01222	Ascension
BASF Corp - Geismar Site	30.18425	-91.002778	Ascension
Union Carbide Corp - St. Charles Plant	29.982289	-90.455622	St. Charles
Phillips 66 Co - Alliance Refinery	29.68406	-89.98145	Plaquemines
Axiall LLC - Plaquemine Facility	30.267167	-91.184258	Iberville
ExxonMobil Fuels & Lubricants Co - Baton Rouge Refinery	30.484392	-91.169444	East Baton Rouge
Equilon Enterprises LLC dba Shell Oil Products US - Convent Refinery	30.107684	-90.890796	St. James
Marathon Petroleum Company LP - Louisiana Refining Division - Garyville Refinery	30.061322	-90.593528	St. John the Baptist
BASF Corp - Zachary Site	29.547603	-90.523231	East Baton Rouge
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188	Ascension
St Rose Refinery LLC - St Rose Refinery	29.950875	-90.328497	St. Charles
ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant	30.56215	-91.20387	East Baton Rouge
Shell Chemical LP - Norco Chemical Plant West Site	30.004925	-90.422381	St. Charles
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884	Ascension
Roehm America LLC - MMA Plant	29.9575	-90.265833	Jefferson
Valero Refining - New Orleans LLC - St Charles Refinery	29.985781	-90.3955	St. Charles
Shell Chemical LP - Norco Chemical Plant - East Site	29.995556	-90.409722	St. Charles
BASF Corp - North Geismar Site	30.20594	-90.99195	Ascension
Stolthaven New Orleans, LLC - Braithwaite Facility	29.870919	-89.949339	Plaquemines



Shintech Louisiana LLC - Shintech Plaquemine Plant	30.273611	-91.173333	Iberville
Denka Performance Elastomer LLC	30.053928	-90.524792	St. John the Baptist
Formosa Plastics Corp Louisiana	30.501722	-91.185944	East Baton Rouge
DuPont Specialty Products USA LLC - Pontchartrain Site	30.05388	-90.52472	St. John the Baptist
Occidental Chemical Corp - Taft Plant	29.987222	-90.454722	St. Charles
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508	Iberville
Mosaic Fertilizer LLC - Faustina Plant	30.083914	-90.91345	St. James
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275	St. James
LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333	Iberville
Occidental Chemical Corporation - Convent Facility	30.055885	-90.830594	St. James
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631	Iberville
Targa Midstream Services LLC	29.237034	-89.384977	Plaquemines
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389	Iberville
EnLink LIG Liquids LLC - Gibson Gas Processing Plant	29.643056	-90.961944	Terrebonne
NuStar Logistics LP - St James Terminal	30.030065	-90.843463	St. James
Enterprise Gas Processing LLC - Norco Fractionation Plant	30.015411	-90.402958	St. Charles
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833	Ascension
INEOS Oxide - A Division of INEOS Americas LLC	30.313889	-91.240278	Iberville
Discovery Producer Services LLC - Discovery Paradis Fractionation Plant	29.858889	-90.453333	St. Charles
Plains Marketing LP - St James Terminal	30.004341	-90.848449	St. James
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833	Ascension
Dyno Nobel LA Ammonia LLC - Ammonia Production Facility	29.964789	-90.264625	Jefferson
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792	Ascension
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819	St. James
YCI Methanol Plant	29.97481	-90.86775	St. James
IGP Methanol LLC - Gulf Coast Methanol Complex	29.625453	-89.926611	Plaquemines
KMe St James Holdings LLC - Methanol Terminal	29.990919	-90.841239	St. James
Kemira Chemicals Inc	29.964722	-90.264722	Jefferson
PHILLIPS 66 PIPELINE LLC	29.923889	-90.482498	St. Charles
CF INDUSTRIES	30.08328	-90.957665	Ascension

## Appendix C: ASPECT Systems

The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 3,000 ft AGL). The system consists of an airborne high-speed Fourier Transform Infra-Red (FTIR) spectrometer coupled with a wide-area IR Line Scanner (IRLS). The ASPECT IR systems can detect chemical compounds in both the 8-to-12-micron (800 to 1200  $\text{cm}^{-1}$ ) and 3 to 5 micron (2000 to 3200  $\text{cm}^{-1}$ ) regions. List of chemicals and detection limits are listed in Table 1. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon - non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The carbon - hydrogen stretch is very common in this region.

An Imperx mapping camera (29 mega pixels; mapping focal plane array) is concurrently operated as part of all chemical collections. These images are often digitally processed in lower resolution, so they can be transmitted via satellite communication. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while in flight or approximately 600 frames per hour can be processed once the data are downloaded from the aircraft. The high-resolution images (>20 MB each) are pulled from the ASPECT after the sortie and are available later.

All aerial photographic images collected by the ASPECT system are ortho-rectified and geospatially validated by the scientific reach back team. In general, this consists of conducting geo-registration using a USGS Digital Elevation Model (DEM) which promotes superior pixel computation and lessens topographic distortion. The image is checked by the team (using a Google Earth base map) for proper location and rotation.

Airborne radiological measurements are conducted using three fully integrated multi-crystal sodium iodide (NaI) RSX4 gamma ray spectrometers. Each RSX4 spectrometer contains four 4"x2"x16" doped NaI crystals each having an independent photomultiplier/spectrometer assembly. One RSX unit is configured with an additional upward NaI crystal utilized to provide real-time cosmic ray correction. Count and energy data from each crystal and pack is combined using a self-calibrating signal processor to generate a virtual detector output. All radiological spectrometer "packs" are further combined using a signal console controlled by the on-board central computer in the aircraft. Altitude correction data is provided by a radar altimeter with internal GPS systems within the packs serving as a backup. It should be noted that no radiological measurements were conducted on this mission.

Data is processed using automated algorithms onboard the aircraft with preliminary results being sent using a satellite system to the ASPECT scientific reach back team for QA/QC analysis. Upon landing, preliminary data results are examined and validated by the

scientific reach back team.

Table 1. ASPECT Automated Compounds

This table contains ASPECT's library of automated compounds.

Detection limits are for each chemical is found in parenthesis in units of parts per million (ppm)

Acetic Acid (2.0)	Cumene (23.1)	Isoprene (6.5)	Phosphine (8.3)
Acetone (5.6)	Diborane (5.0)	Isopropanol (8.5)	Phosphorus Oxychloride (2.0)
Acrolein (8.8)	1,1-Dichloroethene (3.7)	Isopropyl Acetate (0.7)	Propyl Acetate (0.7)
Acrylonitrile (12.5)	Dichloromethane (6.0)	MAPP (3.7)	Propylene (3.7)
Acrylic Acid (3.3)	Dichlorodifluoromethane (0.7)	Methyl Acetate (1.0)	Propylene Oxide (6.8)
Allyl Alcohol (5.3)	1,1-Difluoroethane (0.8)	Methyl Acrylate (1.0)	Silicon Tetrafluoride (0.2)
Ammonia (2.0)	Difluoromethane (0.8)	Methyl Ethyl Ketone (7.5)	Sulfur Dioxide (15)
Arsine (18.7)	Ethanol (6.3)	Methanol (5.4)	Sulfur Hexafluoride (0.07)
Bis-Chloroethyl Ether (1.7)	Ethyl Acetate (0.8)	Methylbromide (60)	Sulfur Mustard (6.0)
Boron Tribromide (0.2)	Ethyl Acrylate (0.8)	Methylene Chloride (1.1)	Sulfuryl Fluoride (1.5)
Boron Trifluoride (5.6)	Ethyl Formate (1.0)	Methyl Methacrylate (3.0)	Tetrachloroethylene (10)
1,3-Butadiene (5.0)	Ethylene (5.0)	MTEB (3.8)	1,1,1-Trichloroethane (1.9)
1-Butene (12.0)	Formic Acid (5.0)	Naphthalene (3.8)	Trichloroethylene (2.7)
2-Butene (18.8)	Freon 134a (0.8)	n-Butyl Acetate (3.8)	Trichloromethane (0.7)
Carbon Tetrachloride (0.2)	GA (Tabun) (0.7)	n-Butyl Alcohol (7.9)	Triethylamine (6.2)
Carbonyl Fluoride (0.8)	GB (Sarin) (0.5)	Nitric Acid (5.0)	Triethylphosphate (0.3)
Carbon Tetrafluoride (0.1)	Germane (1.5)	Nitrogen Mustard (2.5)	Trimethylamine (9.3)
Chlorodifluoromethane (0.6)	Hexafluoroacetone (0.4)	Nitrogen Trifluoride (0.7)	Trimethyl Phosphite (0.4)
Chloromethane (12)	Isobutylene (15)	Phosgene (0.5)	Vinyl Acetate (0.6)

Message

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**From:** Turville Rick [Rick.Turville@kalmancoinc.com]  
**Sent:** 9/5/2021 3:33:31 PM  
**To:** Taylor, Jillianne [Taylor.Jillianne@epa.gov]  
**CC:** mark [mark@spectralsystemsglobal.com]  
**Subject:** Revised report for 4 Sept 2021  
**Attachments:** ASPECT Summary - Hurricane Ida 4 September 2021 V2.docx

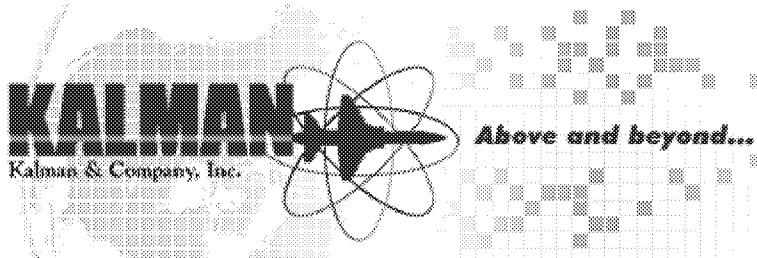
Jill,

Attached is the revised report for 4 Sept 2021 that includes the flight 6 information.

Please let us know if I need to change anything.

R/ Rick

Rick Turville  
Kalman and Company, Inc.  
1000 Corporate Center, Suite 301  
Stafford, VA 22554  
540-628-7325 - Office  
757-353-8302 - Cell



# Airborne Spectral Photometric Environmental Collection Technology

## ASPECT Air Quality Survey Baton Rouge, LA. September 4, 2021



### ASPECT Mission Supporting:

Eric Delgado  
On-Scene Coordinator  
Delgado.Eric@epa.gov

### Initial Mission Request

Brian Fontenot  
Louisiana Department of Environmental  
Quality

### ASPECT TEAM

Jill Taylor  
Chemical/Photometric Lead  
Taylor.Jillianne@EPA.gov  
214-406-9896

Tony Honnellio  
Radiological Lead (Detail)  
Honnellio.Anthony@EPA.gov  
617 947-4414

Ed Argenta  
CBRN CMAD FOB Branch Chief  
Argenta.Edward@EPA.gov  
202-843-4511

## Table of Contents

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## **Acronyms and Abbreviations**

Alt	Altitude (in feet)
AGL	Above Ground Level
cm	centimeter
CDT	Central Daylight Time
DEM	Digital Elevation Model
ESF-10	Emergency Support Function #10 – Oil and Hazardous Materials Response
FEMA	Federal Emergency Management Agency
ft	feet
FTIR	Fourier Transform Infrared Spectrometer
FTP	File Transfer Protocol
igm	Spectral data format based on grams format
IR	Infrared
IRLS	Infrared Line Scanner
jpg	JPEG image format
kts	knots
mph	miles per hour
m/s	meters per second
MSIC	Digital photography file from the Imperx mapping camera
MSL	Mean Sea Level Altitude (in feet)
PAN	peroxyacetyl nitrate
Ppm	parts per million
RMP	Risk Management Plan



UTC

Universal Time Coordinated

## **Executive Summary**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On September 2nd, 2021, the State of Louisiana requested ESF-10 assistance through FEMA and Region 6 asked for the ASPECT plane to be deployed in support of the response to Hurricane Ida. The state wanted assistance monitoring facility emissions in the industrial area between Baton Rouge and New Orleans, where flaring is resulting in the visible emission of black smoke.

ASPECT was tasked to perform remote chemical sensing over target properties to screen for airborne chemicals and take high-resolution photos to provide situational awareness. Potential areas identified for monitoring included: East Baton Rouge, Ascension, Iberville, St. James, St. John, St. Charles, Jefferson, and Orleans. The system conducted one flight mission on 2 September 2021 including air monitoring survey collections over the target area with favorable weather conditions for all passes. Although two black plumes were visible over one of the sites, no major emissions were detected with the FTIR.

A continuation of the overall Baton Rouge facility survey was conducted on 3 September 2021. Two data collection flights were conducted which bracketed a Presidential temporary flight restriction not allowing any flight activity. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.

Flight 5 and 6 were conducted as part of survey operations conducted on 4 September 2021. A total of 17 facilities were surveyed. No compounds were detected other than levels of ozone and peroxyacetyl nitrate. Analysis of IR imagery indicated that some facilities are showing hot process units.

# **ASPECT Air Quality Survey**

## **Hurricane IDA**

### **Baton Rouge, LA**

### **September 4, 2021**

#### **Background and Operational Overview**

Hurricane Ida made landfall at 11:55 AM CDT Sunday, August 30 as a high-end category-4 hurricane, with maximum sustained winds of 150 mph. The storm moved ashore near Port Fourchon, Louisiana after a period of rapid intensification, tying for the fifth strongest landfalling continental US hurricane on record with Hurricane Laura of 2020, among three other hurricanes. Severe wind and large-scale flood damage have been reported to property and infrastructure in much of southeast Louisiana, including significant damage in New Orleans, Louisiana. In addition, Ida has caused widespread damage across the Mid-Atlantic and Northeast US.

On 2 September 2021, ASPECT was tasked to conduct a wide area air quality screening level assessment of areas populated with Risk Management Plan (RMP) sites and petrochemical facilities using the ASPECT system for detections of any airborne contaminants from ASPECT's 76 chemical detection library in the areas affected by Ida. The Region wanted to know if any detections were found, the location of the detection, and the concentration detected. Sites including Marathon Petroleum Company, Shell Norco Facility, and Phillips 66 pipeline site were surveyed. There were no chemical detections at the sites surveyed. Extremely slow satellite transmission speeds (possibly due to high bandwidth use by other first responders) resulted in long delays in data collection. Some chemical photos were pulled down during flight, with the majority needing to be pulled down with a more high-speed internet connection on the ground.

On 3 September 2021 ASPECT was tasked with a continuation of the general Baton Rouge area survey and conducted two flights. 8 locations in the Baton Rouge area were surveyed as part of two flights. A total of 12 active data collection passes were made covering 8 facilities with no chemical plumes or compounds being detected. Other than flares and isolated steam plumes, little process activity was noted in the data.

Flight 5 and 6 were conducted as part of survey operations conducted on 4 September 2021. Collectively, a total of 17 facilities were surveyed.

**Table 1. Sites Covered on 03 September 2021 Flights 5 and 6**

LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833
Westlake Vinyls Co LP	30.209167	-91.017222
Rubicon LLC - Geismar Facility	30.20139	-91.01222
BASF Corp - North Geismar Site	30.20594	-90.99195
BASF Corp - Geismar Site	30.18425	-91.002778
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188
CF INDUSTRIES	30.08328002	-90.957665
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275
NuStar Logistics LP - St James Terminal	30.030065	-90.843463

## **General Mission Objectives**

Once granted access to fly over the sites, the following general mission objectives were employed in conducting data collection with ASPECT:

1. To capture an overall, situational awareness of the incident using aerial photography with:
  - Oblique camera—photos taken by hand from the view/position of the co-pilot, and
  - MSIC photos—advanced camera mounted underneath the plane for a top-down view of the designated sites.
2. To qualitatively locate and characterize any the visible and non-visible components of a plume, as well as any areas on fire:
  - Using the Infrared Line Scanner (IRLS)
3. To screen for the presence and location of specific chemicals within ASPECT's automated chemical detection library:
  - Using the Fourier Transform Infrared (FTIR) Spectrometer

## **Flight Conditions and Status**

### Weather and Site Conditions

Prior to each flight, an updated status of the current and forecasted weather, site conditions and any potential flight obstacles including radio towers impacting safety is assessed by the

crew. A summary of the ground weather conditions during the missions can be found in Table 2 and 3.

**Table 2. Ground Weather for Baton Rouge, LA, Flight 5  
4 September 2021**

Time	953	1053	1153	1253	1353	1453
Wind direction	67.5 degrees ENE	112.5 degrees ESE	292.5 degrees WNW	315 degrees NW	0 degrees	0 degrees
Wind speed	1.3 m/s (3.0 mph)	2.2 m/s (5.0 mph)	2.2 m/s (5.0 mph)	2.2 m/s (5.0 mph)	2.7 m/s (6.0 mph)	1.3 m/s (3.0 mph)
Temperature	27.8 C	30.0 C	31.1 C	31.7 C	31.7 C	32.8 C
Relative humidity	74	70	66	61	61	56
Dew point	22.8 C	23.9 C	23.9 C	23.3 C	23.3 C	22.8 C
Pressure	1013.9 mb	1014.3 mb	1013.9 mb	1013.6 mb	1013.3 mb	1012.3 mb
Ceiling	Clear	Clear	Scattered 4200 Ft	Few 3900 Ft	Scattered 4200 Ft	Few 4600 Ft

**Table 3. Ground Weather for Baton Rouge, LA, Flight 6  
4 September 2021**

Time	1653	1753	1853	1953
Wind direction	0 degrees N	0 degrees N	337.5 degrees NNW	337.5 degrees NNW
Wind speed	4.5 m/s (10.0 mph)	2.7 m/s (6.0 mph)	1.3 m/s (3.0 mph)	2.2 m/s (5.0 mph)
Temperature	23.9 C	24.4 C	23.9 C	21.7 C
Relative humidity	69	67	71	79
Dew point	17.8 C	17.8 C	18.3 C	17.8 C
Pressure	983.8 mb	983.8 mb	983.8 mb	984.1 mb
Ceiling	Overcast 2700 Ft	Broken 2800 Ft	Few 3200 Ft	Clear

## Data Results

The following data is provided as a summary analysis. All data products are available for the Region to access on a shared FTP site. For a complete list of available products, see Appendix A. The data collected during these missions included a flight path summary, IRLS images, FTIR chemical identification and quantification, high resolution MSIC photos, and oblique photos.

### Flight Paths

Wide, slow turns are required to be made in between runs to keep the instruments stable. The blue lines indicate the flight path while the green lines indicate the specific sections of the flight where chemical data was collected and processed. On Flight 1 the Baton Rouge area was surveyed, and the flight path is shown in Figure 1 and 2.



Figure 1. Data Collection Flight Path over the Baton Rouge Area Flight 5, 4 September 2021



Figure 2. Data Collection Flight Path over the Baton Rouge Area Flight 6,

4 September 2021

### Line Scanner Data Results

A total of 31 data collection runs were made over the target facilities and an infrared line scanner image was generated for each collection run. Figure 3 shows a 3-band infrared image collected over the CF Industries facility. Thermal analysis shows that many of the facilities are showing process units have some activity. The process unit located in the middle of figure 3 indicates hot units and hot piping. Other than thermal, no chemical plumes can be observed being emitted from the facility. Figure 4 shows a similar image collected on Flight 6 over the Occidental Chemical facility.

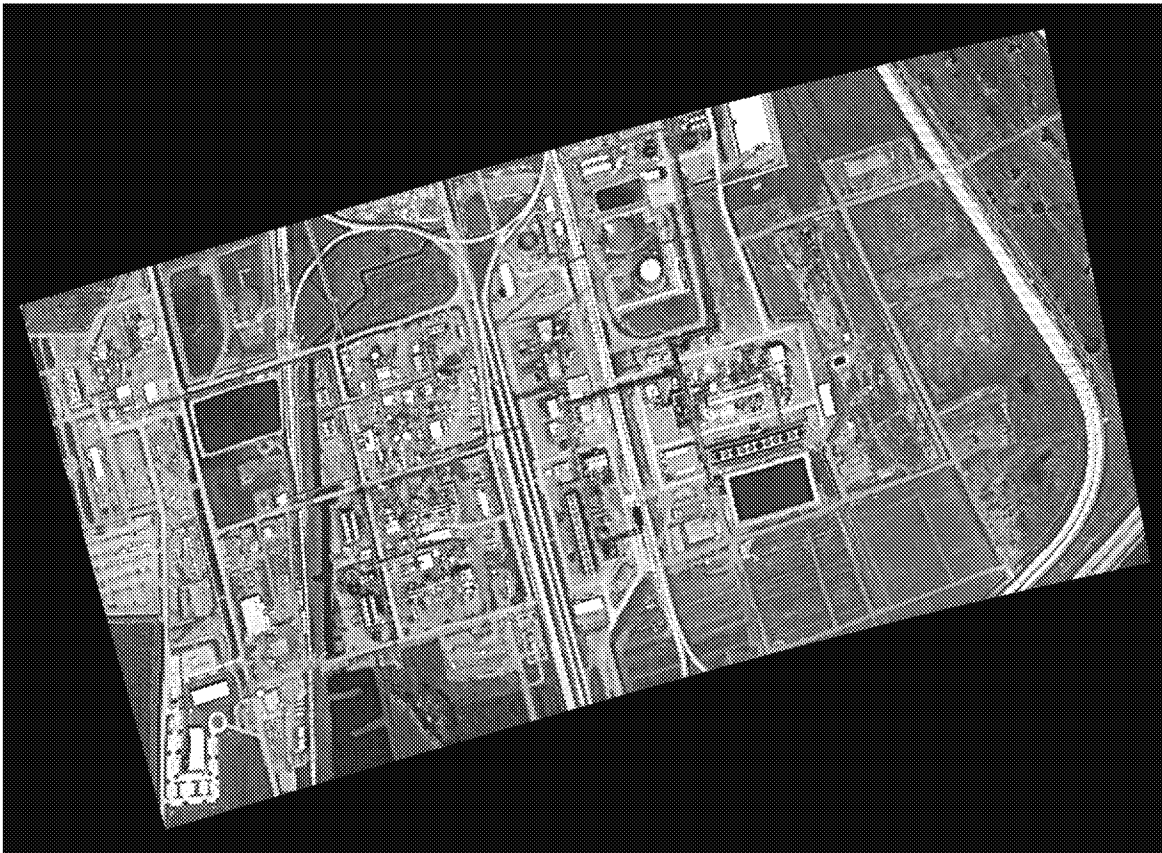


Figure 3. Three band IR image, Baton Rouge Area, Run 23, Flight 5, 4 September 2021

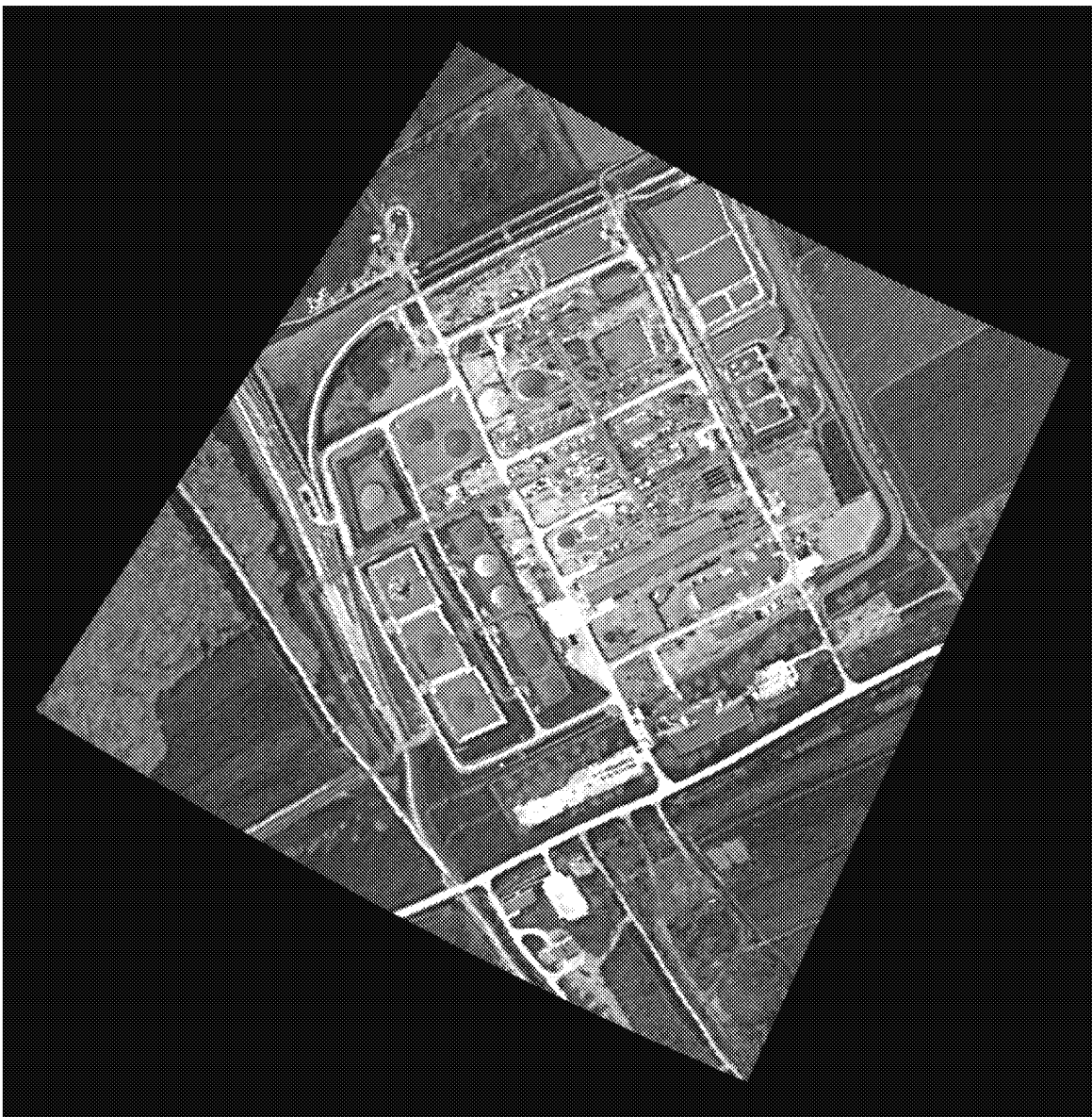


Figure 4. Three band IR image, Baton Rouge Area, Run 5, Flight 6, 4 September 2021

#### FTIR Data Results

FTIR spectral data at a resolution of 16 wavenumbers was collected for each run. ASPECT uses an automated detection algorithm to permit compounds to be automatically analyzed while the aircraft is in flight. Seventy-six chemical compounds are included in the airborne algorithm library (the list is provided in Appendix B, Table 1). In addition, collected data was also manually quality checked against a collection of published library spectra for each chemical detected.



ASTECT did not detect any programmed compounds (those found in Appendix B, Table 1) as part of the mission over the Baton Rouge areas on the two flights conducted on 3 September 2021. Details of the monitoring results can be found in Table 4 and 5.

**Table 4. Chemical Results Summary  
Baton Rouge Collection Area, Flight 5**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
1	2021-09-04	14:13:50	Test	Test
2		15:01:22	ND	ND
3		15:12:15	ND	ND
4		15:24:47	ND	ND
5		15:32:46	ND	ND
6		15:42:23	ND	ND
7		15:51:20	ND	ND
8		16:02:17	ND	ND
9		16:09:39	ND	ND
10		16:18:48	ND	ND
11		16:27:35	ND	ND
12		16:35:25	ND	ND
13		16:45:24	ND	ND
14		16:52:56	ND	ND
15		17:07:25	ND	ND
16		17:18:42	ND	ND
17		17:28:17	ND	ND
18		17:34:43	ND	ND
19		17:49:52	ND	ND
20		17:56:26	ND	ND
21		18:08:41	ND	ND
22		18:15:49	ND	ND
23		18:21:56	ND	ND

**Table 5. Chemical Results Summary  
Baton Rouge Collection Area, Flight 6**

Pass	Date	Time (UTC)	Chemical	Max Concentration (ppm)
1	2021-09-04	22:50:57	ND	ND
2		22:54:08	ND	ND
3		23:05:33	ND	ND
4		23:22:35	ND	ND
5		23:25:21	ND	ND
6		23:34:31	ND	ND
7		23:36:23	ND	ND

#### Aerial Photography Results

A full set of high-resolution aerial digital photography were collected as part of each data collection pass. Weather conditions over the Baton Rouge allowed high quality aerial images to be collected. Figures 5 shows a representative aerial image collected over the Syngenta Crop Protection facility. Figure 6 shows a representative oblique with evidence of plant activity due to the steam plume.

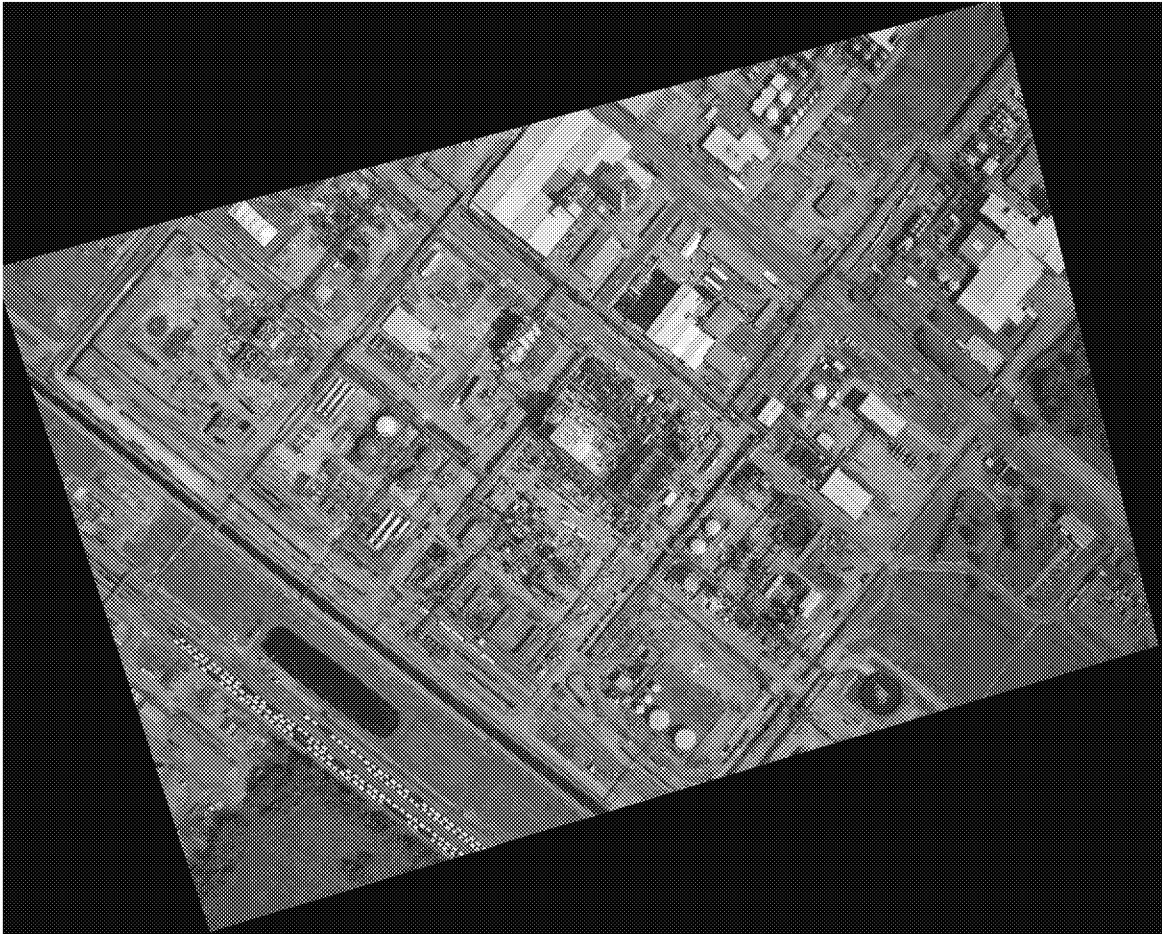


Figure 3. MSIC image of the Syngenta Crop Protection facility, Flight 5, 4 September 2021



Figure 6. Oblique photo taken over the TBD Facility as part of Flight 5, 4 September 2021

## Conclusion

Two data collection flights were conducted on 4 September 2021 focusing on facilities south of Baton Rouge. A total of 29 active data collection passes were made covering 17 facilities. Analysis of IR imagery indicated that some facilities are showing hot process units. No chemical plumes or compounds being detected.

## Appendix A: File Names of Data Collected During Flight

### Baton Rouge Collection Areas, Flight 5, 4 September 2021

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files	Gamma Files
1	14:13:50	5761	155	20210904141356969.jpg 20210904141403318.jpg 20210904141409674.jpg	20210904_141354_A.igm	2021_09_04_14_13_55_R_01 TA=20.6;TB=41.4;Gain=3	
2	15:01:22	2861	105	20210904150128661.jpg 20210904150135011.jpg 20210904150141375.jpg	20210904_150125_A.igm	2021_09_04_15_01_28_R_02 TA=22.5;TB=42.4;Gain=3	
3	15:12:15	2899	106	20210904151221430.jpg 20210904151227795.jpg 20210904151234138.jpg	20210904_151219_A.igm	2021_09_04_15_12_20_R_03 TA=24.9;TB=44.9;Gain=3	
4	15:24:47	2883	108	20210904152453167.jpg 20210904152459532.jpg 20210904152505881.jpg	20210904_152450_A.igm	2021_09_04_15_24_52_R_04 TA=25.0;TB=44.9;Gain=3	
5	15:32:46	2885	107	20210904153252537.jpg 20210904153258886.jpg 20210904153305250.jpg 20210904153312514.jpg	20210904_153249_A.igm	2021_09_04_15_32_52_R_05 TA=24.7;TB=44.9;Gain=3	
6	15:42:23	2904	105	20210904154229045.jpg 20210904154235410.jpg 20210904154241760.jpg 20210904154248110.jpg 20210904154254474.jpg 20210904154301728.jpg	20210904_154226_A.igm	2021_09_04_15_42_28_R_06 TA=26.1;TB=45.2;Gain=3	
7	15:51:20	2901	105	20210904155126521.jpg 20210904155132871.jpg 20210904155139231.jpg 20210904155145580.jpg 20210904155151945.jpg 20210904155158294.jpg	20210904_155123_A.igm	2021_09_04_15_51_25_R_07 TA=24.6;TB=44.7;Gain=3	
8	16:02:17	2891	110	20210904160222922.jpg 20210904160229287.jpg 20210904160235646.jpg 20210904160241995.jpg 20210904160249259.jpg	20210904_160220_A.igm	2021_09_04_16_02_22_R_08 TA=25.5;TB=45.4;Gain=3	
9	16:09:39	2926	105	20210904160945066.jpg 20210904160951431.jpg 20210904160958685.jpg 20210904161005049.jpg 20210904161011398.jpg 20210904161014122.jpg	20210904_160942_A.igm	2021_09_04_16_09_45_R_09 TA=26.2;TB=46.4;Gain=3	
10	16:18:48	2917	108	20210904161854355.jpg 20210904161900704.jpg 20210904161907054.jpg 20210904161913419.jpg 20210904161920673.jpg 20210904161927037.jpg	20210904_161851_A.igm	2021_09_04_16_18_54_R_10 TA=26.4;TB=46.4;Gain=3	
11	16:27:35	2931	107	20210904162741837.jpg 20210904162748186.jpg 20210904162754551.jpg 20210904162800900.jpg 20210904162807249.jpg 20210904162813614.jpg	20210904_162738_A.igm 20210904_162817_A.igm	2021_09_04_16_27_41_R_11 TA=26.3;TB=46.6;Gain=3	

				20210904162819963.jpg 20210904162826328.jpg			
12	16:35:25	2916	108	20210904163531214.jpg 20210904163537563.jpg 20210904163543928.jpg 20210904163551184.jpg 20210904163557549.jpg 20210904163603898.jpg 20210904163610263.jpg 20210904163616612.jpg	20210904_163528_A.igm 20210904_163608_A.igm	2021_09_04_16_35_31_R_12 TA=26.5;TB=46.6;Gain=3	
13	16:45:24	2914	114	20210904164531333.jpg 20210904164537688.jpg 20210904164544037.jpg	20210904_164527_A.igm	2021_09_04_16_45_30_R_13 TA=26.5;TB=46.6;Gain=3	
14	16:52:56	2877	109	20210904165302552.jpg 20210904165309821.jpg 20210904165316170.jpg 20210904165322535.jpg 20210904165328885.jpg	20210904_165300_A.igm	2021_09_04_16_53_02_R_14 TA=27.1;TB=47.3;Gain=3	
15	17:07:25	2888	107	20210904170731415.jpg 20210904170737764.jpg 20210904170744113.jpg 20210904170751383.jpg 20210904170757737.jpg 20210904170804102.jpg 20210904170810445.jpg 20210904170816810.jpg 20210904170823153.jpg 20210904170829518.jpg 20210904170835867.jpg 20210904170842232.jpg	20210904_170729_A.igm 20210904_170808_A.igm	2021_09_04_17_07_31_R_15 TA=26.7;TB=46.7;Gain=3	
16	17:18:42	2896	103	20210904171848705.jpg 20210904171855055.jpg 20210904171902324.jpg 20210904171908673.jpg 20210904171915023.jpg 20210904171921387.jpg 20210904171927737.jpg 20210904171934101.jpg 20210904171940451.jpg 20210904171946800.jpg 20210904171948625.jpg	20210904_171845_A.igm 20210904_171924_A.igm	2021_09_04_17_18_49_R_16 TA=32.7;TB=52.1;Gain=3	
17	17:28:17	2896	109	20210904172823395.jpg 20210904172829744.jpg 20210904172836109.jpg 20210904172842458.jpg 20210904172848823.jpg 20210904172856077.jpg 20210904172902442.jpg 20210904172908785.jpg	20210904_172820_A.igm 20210904_172859_A.igm	2021_09_04_17_28_23_R_17 TA=28.2;TB=48.3;Gain=3	
18	17:34:43	2872	100	20210904173449245.jpg 20210904173455610.jpg 20210904173501959.jpg 20210904173508324.jpg 20210904173514673.jpg 20210904173521943.jpg 20210904173528292.jpg 20210904173534651.jpg 20210904173541000.jpg	20210904_173446_A.igm 20210904_173525_A.igm	2021_09_04_17_34_49_R_18 TA=29.1;TB=49.0;Gain=3	
19	17:49:52	2912	124	20210904174958958.jpg 20210904175005323.jpg	20210904_174954_A.igm	2021_09_04_17_49_58_R_19 TA=31.1;TB=51.0;Gain=3	

				20210904175011672.jpg 20210904175018021.jpg			
20	17:56:26	2882	102	20210904175632080.jpg 20210904175638430.jpg 20210904175644794.jpg 20210904175651151.jpg 20210904175658405.jpg 20210904175704754.jpg 20210904175711119.jpg 20210904175717468.jpg 20210904175723832.jpg 20210904175730182.jpg	20210904_175629_A.igm 20210904_175709_A.igm	2021_09_04_17_56_32_R_20 TA=29.7;TB=49.6;Gain=3	
21	18:08:41	2901	99	20210904180847467.jpg 20210904180854731.jpg 20210904180901096.jpg 20210904180907445.jpg 20210904180913794.jpg 20210904180920159.jpg	20210904_180844_A.igm	2021_09_04_18_08_48_R_21 TA=28.3;TB=48.5;Gain=3	
22	18:15:49	2905	113	20210904181555083.jpg 20210904181601447.jpg 20210904181607797.jpg 20210904181614161.jpg 20210904181620511.jpg 20210904181627780.jpg	20210904_181551_A.igm	2021_09_04_18_15_55_R_22 TA=33.5;TB=53.6;Gain=3	
23	18:21:56	2896	114	20210904182201886.jpg 20210904182209140.jpg 20210904182215489.jpg 20210904182221854.jpg 20210904182228203.jpg 20210904182234568.jpg	20210904_182158_A.igm	2021_09_04_18_22_02_R_23 TA=33.4;TB=53.6;Gain=3	

### Baton Rouge Collection Areas, Flight 6, 4 September 2021

Run#	Time (UTC)	Altitude (MSL)	Velocity (knots)	MSIC Data Files	FTIR Data Files	IRLS Data Files	Gamma Files
1	22:50:57	2910	109	20210904225102949.jpg 20210904225109314.jpg 20210904225115663.jpg	20210904_225100_A.igm	2021_09_04_22_51_01_R_01 TA=29.8;TB=50.5;Gain=3	
2	22:54:08	2934	102	20210904225413613.jpg 20210904225419962.jpg 20210904225426327.jpg	20210904_225411_A.igm	2021_09_04_22_54_12_R_02 TA=23.1;TB=43.9;Gain=3	
3	23:05:33	2920	101	20210904230539979.jpg 20210904230546344.jpg 20210904230552693.jpg 20210904230559042.jpg 20210904230605407.jpg 20210904230611757.jpg 20210904230618106.jpg 20210904230625375.jpg 20210904230631725.jpg 20210904230638089.jpg	20210904_230537_A.igm 20210904_230617_A.igm	2021_09_04_23_05_38_R_03 TA=23.0;TB=43.2;Gain=3	
4	23:22:35	2870	107	20210904232240461.jpg 20210904232247728.jpg 20210904232254077.jpg 20210904232300442.jpg 20210904232306791.jpg	20210904_232239_A.igm	2021_09_04_23_22_39_R_04 TA=24.3;TB=44.4;Gain=3	
5	23:25:21	2928	103	20210904232528425.jpg 20210904232534774.jpg 20210904232541139.jpg	20210904_232525_A.igm	2021_09_04_23_25_26_R_05 TA=24.3;TB=44.3;Gain=3	

6	23:34:31	3002	111	20210904233437701.jpg 20210904233444050.jpg 20210904233450402.jpg 20210904233456767.jpg	20210904_233434_A.igm	2021_09_04_23_34_35_R_06 TA=21.9;TB=41.8;Gain=3	
7	23:36:23	2878	109	20210904233628468.jpg 20210904233635722.jpg 20210904233642081.jpg 20210904233648430.jpg	20210904_233627_A.igm	2021_09_04_23_36_27_R_07 TA=21.9;TB=41.8;Gain=3	

**Appendix B: Priority Sites Provided by EPA Region 6 & Louisiana Department of  
Environmental Quality**

<b>Facility_Name</b>	<b>Latitude</b>	<b>Longitude</b>	<b>Parish</b>
Deltech LLC - Baton Rouge Facility	30.552892	-91.200536	East Baton Rouge
ExxonMobil Chemical Co - Baton Rouge Plastics Plant	30.551419	-91.175611	East Baton Rouge
ExxonMobil Baton Rouge Chemical Plant	30.484336	-91.169644	East Baton Rouge
Marathon Petroleum Co LP	30.068394	-90.596364	St. John the Baptist
Westlake Vinyls Co LP	30.209167	-91.017222	Ascension
Valero Refining - Meraux LLC - Meraux Refinery	29.930222	-89.944917	St. Bernard
Cornerstone Chemical Company	29.964722	-90.264722	Jefferson
Chalmette Refining LLC	29.937903	-89.969903	St. Bernard
ExxonMobil Chemical Company - Baton Rouge Chemicals North Plant	30.50465	-91.173219	East Baton Rouge
Equilon Enterprises LLC - Norco Refinery	29.995372	-90.410167	St. Charles
The Dow Chemical Company - Louisiana Operations	30.313927	-91.240586	Iberville
Rubicon LLC - Geismar Facility	30.20139	-91.01222	Ascension
BASF Corp - Geismar Site	30.18425	-91.002778	Ascension
Union Carbide Corp - St. Charles Plant	29.982289	-90.455622	St. Charles
Phillips 66 Co - Alliance Refinery	29.68406	-89.98145	Plaquemines
Axiall LLC - Plaquemine Facility	30.267167	-91.184258	Iberville
ExxonMobil Fuels & Lubricants Co - Baton Rouge Refinery	30.484392	-91.169444	East Baton Rouge
Equilon Enterprises LLC dba Shell Oil Products US - Convent Refinery	30.107684	-90.890796	St. James
Marathon Petroleum Company LP - Louisiana Refining Division - Garyville Refinery	30.061322	-90.593528	St. John the Baptist
BASF Corp - Zachary Site	29.547603	-90.523231	East Baton Rouge
Occidental Chemical Corporation - Geismar Facility	30.18819	-90.98188	Ascension
St Rose Refinery LLC - St Rose Refinery	29.950875	-90.328497	St. Charles
ExxonMobil Chemical Co - Baton Rouge Polyolefins Plant	30.56215	-91.20387	East Baton Rouge
Shell Chemical LP - Norco Chemical Plant West Site	30.004925	-90.422381	St. Charles
NOVA Chemicals Olefins LLC - Geismar Ethylene Plant	30.230619	-91.052884	Ascension
Roehm America LLC - MMA Plant	29.9575	-90.265833	Jefferson
Valero Refining - New Orleans LLC - St Charles Refinery	29.985781	-90.3955	St. Charles
Shell Chemical LP - Norco Chemical Plant - East Site	29.995556	-90.409722	St. Charles



BASF Corp - North Geismar Site	30.20594	-90.99195	Ascension
Stolthaven New Orleans, LLC - Braithwaite Facility	29.870919	-89.949339	Plaquemines
Shintech Louisiana LLC - Shintech Plaquemine Plant	30.273611	-91.173333	Iberville
Denka Performance Elastomer LLC	30.053928	-90.524792	St. John the Baptist
Formosa Plastics Corp Louisiana	30.501722	-91.185944	East Baton Rouge
DuPont Specialty Products USA LLC - Pontchartrain Site	30.05388	-90.52472	St. John the Baptist
Occidental Chemical Corp - Taft Plant	29.987222	-90.454722	St. Charles
Syngenta Crop Protection LLC - St Gabriel Plant	30.246728	-91.103508	Iberville
Mosaic Fertilizer LLC - Faustina Plant	30.083914	-90.91345	St. James
Mosaic Fertilizer LLC - Uncle Sam Plant	30.037222	-90.8275	St. James
LBC Baton Rouge LLC - Sunshine Terminal	30.294444	-91.148333	Iberville
Occidental Chemical Corporation - Convent Facility	30.055885	-90.830594	St. James
TOTAL Petrochemicals & Refining USA Inc - Carville Polystyrene Plant	30.229786	-91.073631	Iberville
Targa Midstream Services LLC	29.237034	-89.384977	Plaquemines
EnLink LIG Liquids LLC - Plaquemine Gas Processing Plant	30.236389	-91.241389	Iberville
EnLink LIG Liquids LLC - Gibson Gas Processing Plant	29.643056	-90.961944	Terrebonne
NuStar Logistics LP - St James Terminal	30.030065	-90.843463	St. James
Enterprise Gas Processing LLC - Norco Fractionation Plant	30.015411	-90.402958	St. Charles
Lone Star NGL Refinery Services LLC - Geismar Fractionation Plant	30.218889	-91.035833	Ascension
INEOS Oxide - A Division of INEOS Americas LLC	30.313889	-91.240278	Iberville
Discovery Producer Services LLC - Discovery Paradis Fractionation Plant	29.858889	-90.453333	St. Charles
Plains Marketing LP - St James Terminal	30.004341	-90.848449	St. James
Methanex USA Services LLC - Geismar Methanol Plant	30.206667	-91.020833	Ascension
Dyno Nobel LA Ammonia LLC - Ammonia Production Facility	29.964789	-90.264625	Jefferson
Kinder Morgan Liquids Terminals LLC - Geismar Methanol Terminal	30.205389	-91.023792	Ascension
South LA Methanol LP - St James Methanol Plant	30.039917	-90.863819	St. James
YCI Methanol Plant	29.97481	-90.86775	St. James
IGP Methanol LLC - Gulf Coast Methanol Complex	29.625453	-89.926611	Plaquemines
KMe St James Holdings LLC - Methanol Terminal	29.990919	-90.841239	St. James
Kemira Chemicals Inc	29.964722	-90.264722	Jefferson
PHILLIPS 66 PIPELINE LLC	29.923889	-90.482498	St. Charles
CF INDUSTRIES	30.08328	-90.957665	Ascension



## Appendix C: ASPECT Systems

The US EPA ASPECT system collects airborne infrared (IR) images and chemical screening data from a safe distance over the site (about 3,000 ft AGL). The system consists of an airborne high-speed Fourier Transform Infra-Red (FTIR) spectrometer coupled with a wide-area IR Line Scanner (IRLS). The ASPECT IR systems can detect chemical compounds in both the 8-to-12-micron (800 to 1200  $\text{cm}^{-1}$ ) and 3 to 5 micron (2000 to 3200  $\text{cm}^{-1}$ ) regions. List of chemicals and detection limits are listed in Table 1. The 8 to 12 micron region is typically known as the atmospheric window region since the band is reasonably void of water and carbon dioxide influence. Spectrally, this region is used to detect carbon - non-carbon bonded compounds. The 3 to 5 micron region is also free of water and carbon dioxide but typically does not have sufficient energy for use. This band does show use in high-energy environments such as fires. The carbon - hydrogen stretch is very common in this region.

An Imperx mapping camera (29 mega pixels; mapping focal plane array) is concurrently operated as part of all chemical collections. These images are often digitally processed in lower resolution, so they can be transmitted via satellite communication. All imagery is geo-rectified using both aircraft attitude correction (pitch, yaw, and roll) and GPS positional information. Imagery can be processed while in flight or approximately 600 frames per hour can be processed once the data are downloaded from the aircraft. The high-resolution images (>20 MB each) are pulled from the ASPECT after the sortie and are available later.

All aerial photographic images collected by the ASPECT system are ortho-rectified and geospatially validated by the scientific reach back team. In general, this consists of conducting geo-registration using a USGS Digital Elevation Model (DEM) which promotes superior pixel computation and lessens topographic distortion. The image is checked by the team (using a Google Earth base map) for proper location and rotation.

Airborne radiological measurements are conducted using three fully integrated multi-crystal sodium iodide (NaI) RSX4 gamma ray spectrometers. Each RSX4 spectrometer contains four 4"x2"x16" doped NaI crystals each having an independent photomultiplier/spectrometer assembly. One RSX unit is configured with an additional upward NaI crystal utilized to provide real-time cosmic ray correction. Count and energy data from each crystal and pack is combined using a self-calibrating signal processor to generate a virtual detector output. All radiological spectrometer "packs" are further combined using a signal console controlled by the on-board central computer in the aircraft. Altitude correction data is provided by a radar altimeter with internal GPS systems within the packs serving as a backup. It should be noted that no radiological measurements were conducted on this mission.

Data is processed using automated algorithms onboard the aircraft with preliminary results being sent using a satellite system to the ASPECT scientific reach back team for QA/QC analysis. Upon landing, preliminary data results are examined and validated by the

scientific reach back team.

Table 1. ASPECT Automated Compounds

This table contains ASPECT's library of automated compounds.  
 Detection limits are for each chemical is found in parenthesis in units of parts per million (ppm)

Acetic Acid (2.0)	Cumene (23.1)	Isoprene (6.5)	Phosphine (8.3)
Acetone (5.6)	Diborane (5.0)	Isopropanol (8.5)	Phosphorus Oxychloride (2.0)
Acrolein (8.8)	1,1-Dichloroethene (3.7)	Isopropyl Acetate (0.7)	Propyl Acetate (0.7)
Acrylonitrile (12.5)	Dichloromethane (6.0)	MAPP (3.7)	Propylene (3.7)
Acrylic Acid (3.3)	Dichlorodifluoromethane (0.7)	Methyl Acetate (1.0)	Propylene Oxide (6.8)
Allyl Alcohol (5.3)	1,1-Difluoroethane (0.8)	Methyl Acrylate (1.0)	Silicon Tetrafluoride (0.2)
Ammonia (2.0)	Difluoromethane (0.8)	Methyl Ethyl Ketone (7.5)	Sulfur Dioxide (15)
Arsine (18.7)	Ethanol (6.3)	Methanol (5.4)	Sulfur Hexafluoride (0.07)
Bis-Chloroethyl Ether (1.7)	Ethyl Acetate (0.8)	Methylbromide (60)	Sulfur Mustard (6.0)
Boron Tribromide (0.2)	Ethyl Acrylate (0.8)	Methylene Chloride (1.1)	Sulfuryl Fluoride (1.5)
Boron Trifluoride (5.6)	Ethyl Formate (1.0)	Methyl Methacrylate (3.0)	Tetrachloroethylene (10)
1,3-Butadiene (5.0)	Ethylene (5.0)	MTEB (3.8)	1,1,1-Trichloroethane (1.9)
1-Butene (12.0)	Formic Acid (5.0)	Naphthalene (3.8)	Trichloroethylene (2.7)
2-Butene (18.8)	Freon 134a (0.8)	n-Butyl Acetate (3.8)	Trichloromethane (0.7)
Carbon Tetrachloride (0.2)	GA (Tabun) (0.7)	n-Butyl Alcohol (7.9)	Triethylamine (6.2)
Carbonyl Fluoride (0.8)	GB (Sarin) (0.5)	Nitric Acid (5.0)	Triethylphosphate (0.3)
Carbon Tetrafluoride (0.1)	Germane (1.5)	Nitrogen Mustard (2.5)	Trimethylamine (9.3)
Chlorodifluoromethane (0.6)	Hexafluoroacetone (0.4)	Nitrogen Trifluoride (0.7)	Trimethyl Phosphite (0.4)
Chloromethane (12)	Isobutylene (15)	Phosgene (0.5)	Vinyl Acetate (0.6)

Message

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**From:** Argenta, Edward [Argenta.Edward@epa.gov]  
**Sent:** 9/6/2021 4:29:44 AM  
**To:** Perovich, Gina [Perovich.Gina@epa.gov]  
**CC:** Taylor, Jillianne [Taylor.Jillianne@epa.gov]; Honnellio, Anthony [Honnellio.Anthony@epa.gov]; Jakabhazy, Elise [Jakabhazy.Elise@epa.gov]; Ledbetter, Ray [Ledbetter.Ray@epa.gov]  
**Subject:** ASPECT Hurricane Ida Response Summary 9/5/21

Hi Gina,

Sorry I didn't think of this myself.

ASPECT Ida Support Summary:

The EPA's ASPECT capability received a mission assignment to assist LA with their response to Hurricane Ida on 9/2/2021. Since that time, ASPECT has performed 7 data flight executing chemical hazard screening via multi-spectral sensing technologies and captured high resolution photography to assist LDEQ, EPA R6, and other federal partners with assessing damage to facilities. We have collected data on 59/60 of the identified priority sites along with additional targets of opportunities identified during flight or interagency discussions. ASPECT detected a reportable low level ammonia detection at a point of interest on 9/4 and was able to demonstrate the oil detection capability near Port Fourchon, LA on 9/5. ASPECT has executed 31.4 hours of flight. On 9/6/2021, ASPECT plans to complete the last site collect and potentially perform additional passes over priority POIs, assist USCG with oil detection, and/or assess new POIs from LDEQ and/or EPA R6. There is a high likelihood that the PM mission will be impacted by Thunderstorms and may not occur.

ASPECT data reports can be found on the [response.epa.gov](https://response.epa.gov) -

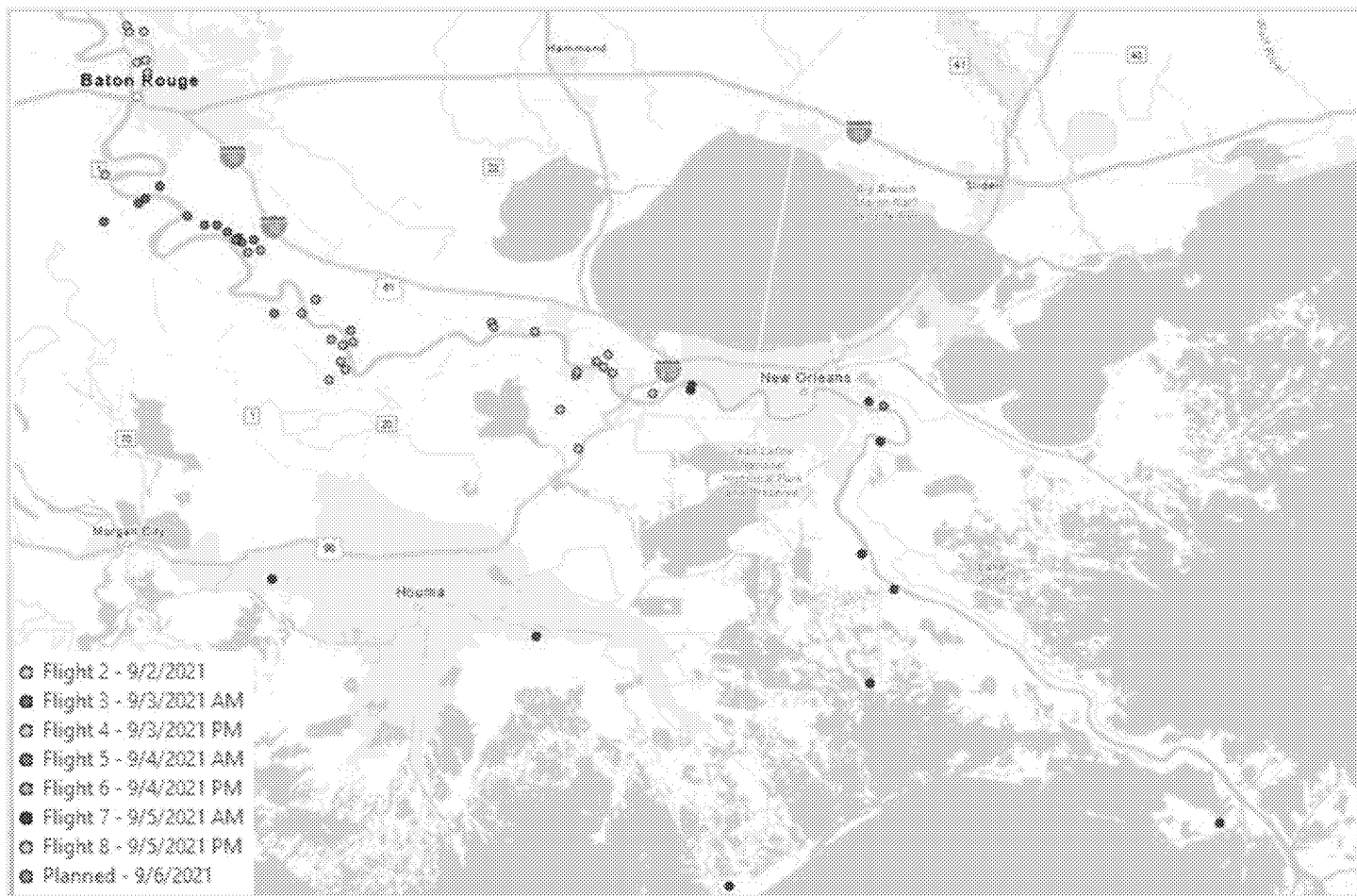
[https://response.epa.gov/site/site\\_profile.aspx?site\\_id=15323](https://response.epa.gov/site/site_profile.aspx?site_id=15323)

OEM-CMAD recently found the following press coverage of ASPECT and its activities.

<https://apnews.com/article/business-environment-and-nature-oil-spills-b86c00b79c13613e08255384c27008d8>

<https://www.reuters.com/world/us/us-epa-responds-report-oil-spill-after-ida-by-activating-special-aircraft-2021-09-03/>

Below is a graphical representation of all of the facilities we have collected on and the date the collection was performed one. Thursday 9/3 mission was impacted by a VIP in the area.



Thanks,  
Ed

Edward Argenta Jr  
Branch Chief  
Field Operations Branch  
CBRN Consequence Management Advisory Division  
Office of Emergency Management  
[Argenta.edward@epa.gov](mailto:Argenta.edward@epa.gov)  
Gov't Mobile: 202.843.4511  
Office #: 202.564.4528  
Office: WJC-N - B517R

Message

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**From:** Argenta, Edward [Argenta.Edward@epa.gov]  
**Sent:** 9/1/2021 1:37:05 PM  
**To:** Russell, Glen [glen.russell@fema.dhs.gov]  
**CC:** Stephens, Kimberly [kimberly.stephens@fema.dhs.gov]; Barker, Adam [adam.barker@fema.dhs.gov]; Pandey, Siddharth [spandey@Dewberry.com]; Dean, Paul [pdean@Dewberry.com]; Taylor, Jillianne [Taylor.Jillianne@epa.gov]; Vaughan, Christopher [Christopher.Vaughan2@fema.dhs.gov]  
**Subject:** EPA ASPECT Mission Assignment  
**Attachments:** PSMA 151 Aerial Platforms.pdf

Hi Glen and others,

I'm sorry I had to drop off early yesterday. I believe Tony Honnellio spoke on my behalf and I received some feedback on if ASPECT has a specific FEMA Mission Assignment already. I wanted to pass along that we do and can be tasked directly if the national response could benefit from our capability. I've attached the PSMA for your reference. We can be airborne within an hour of a tasking. We're here to help and if there's a better POC to discuss our capability and assistance with please let me know (I believe you mentioned syncing us with USCG New Orleans Sector to assist with their POIs).

After this response is over, it would be great if we could meet up and discuss these type of responses for my understanding. I believe we have a unique asset that can assist, but I'm unclear on the best paths to achieve that.

And yes, if we hear or identify any hazardous emissions we'll be certain to pass those on.

Respectfully,  
Ed

Edward Argenta Jr  
Branch Chief  
Field Operations Branch  
CBRN Consequence Management Advisory Division  
Office of Emergency Management  
[Argenta.edward@epa.gov](mailto:Argenta.edward@epa.gov)  
Gov't Mobile: 202.843.4511  
Office #: 202.564.4528  
Office: WJC-N - B517R

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**From:** Vaughan, Christopher <Christopher.Vaughan2@fema.dhs.gov>  
**Sent:** Monday, August 30, 2021 10:50 AM  
**To:** Argenta, Edward <Argenta.Edward@epa.gov>; Russell, Glen <glen.russell@fema.dhs.gov>  
**Cc:** Stephens, Kimberly <kimberly.stephens@fema.dhs.gov>; Barker, Adam <adam.barker@fema.dhs.gov>; Pandey, Siddharth <spandey@Dewberry.com>; Dean, Paul <pdean@Dewberry.com>; Taylor, Jillianne <Taylor.Jillianne@epa.gov>  
**Subject:** RE: Daily FEMA Remote Sensing Coordination Call - Hurricane Ida

Thanks Ed,

I'll defer to Glen on the overall remote sensing requirements-

Break-



If you all hear reports of hazardous material leaks/spillage that would require assistance, monitoring, please keep in the loop.

---

**From:** Argenta, Edward <Argenta.Edward@epa.gov>  
**Sent:** Monday, August 30, 2021 10:03 AM  
**To:** Russell, Glen <glen.russell@fema.dhs.gov>  
**Cc:** Vaughan, Christopher <Christopher.Vaughan2@fema.dhs.gov>; Stephens, Kimberly <kimberly.stephens@fema.dhs.gov>; Barker, Adam <adam.barker@fema.dhs.gov>; Pandey, Siddharth <spandey@Dewberry.com>; Dean, Paul <pdean@Dewberry.com>; Taylor, Jillianne <Taylor.Jillianne@epa.gov>  
**Subject:** RE: Daily FEMA Remote Sensing Coordination Call - Hurricane Ida

Hi Glen,

The EPA ASPECT asset can also provide real-time (~5 minutes during flight) ortho-rectified NADIR imagery with high resolution imagery available upon data download after landing (time varies due to network speed connections). Pilot/Operators can take oblique ad hoc photography also. Videography is also available. Technical specifications on photometric capabilities are in the below table. I recognize our asset has unique capabilities to support Chemical/Radiation screening, but we are available to assist with our photometric capability if that is needed and can re-task our mission in flight as needed. Please let us know if/how we can be of assistance. We may be able to be tasked directly through HQ to support this mission.

**TABLE 9 - Imperx Aerial Digital Camera Technical Specifications**

<b>System:</b>	Imperx B6640 body
<b>Detectors:</b>	29-megapixel digital CCD sensor (KAI-29050)
<b>Aspect Ratio:</b>	4:5
<b>Lens:</b>	24 mm Digital Compatible
<b>Field of View (FOV):</b>	824 meters Cross flight and 548 meters Direction of Flight @ 850 meter collection altitude (AGL)
<b>Pixel Resolution (IFOV):</b>	92 cm @ 850 meter collection altitude (AGL)
<b>Frame Timing and Collection Rate:</b>	Operator Selectable, 1 to 15 seconds, Approximately 600 frames per hour for normal mission
<b>Trigger Control:</b>	Automatic, Manual, and Slave
<b>Power:</b>	12 vdc @ 1 amp full load
<b>Spin-up Time:</b>	Less than 2 minutes from System Start
<b>Standard Outputs:</b>	JPEG, TrueSense
<b>Data Processing:</b>	Full INS/GPS Geospatial Rectification

Respectfully,  
Ed

Edward Argenta Jr  
Branch Chief  
Field Operations Branch  
CBRN Consequence Management Advisory Division  
Office of Emergency Management  
[Argenta.edward@epa.gov](mailto:Argenta.edward@epa.gov)  
Gov't Mobile: 202.843.4511  
Office #: 202.564.4528  
Office: WJC-N - B517R

-----Original Appointment-----

**From:** [glen.russell@fema.dhs.gov](mailto:glen.russell@fema.dhs.gov) <[glen.russell@fema.dhs.gov](mailto:glen.russell@fema.dhs.gov)> **On Behalf Of** Pandey, Siddharth  
**Sent:** Sunday, August 29, 2021 5:32 PM  
**To:** Argenta, Edward; Dean, Paul; Russell, Glen; Vaughan, Christopher; Stephens, Kimberly; Barker, Adam  
**Subject:** FW: Daily FEMA Remote Sensing Coordination Call - Hurricane Ida

**When:** Occurs every day effective 8/29/2021 until 9/17/2021 from 2:30 PM to 3:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** Microsoft Teams Meeting

As requested, Sir.

Respectfully,

Glen

Glen Russell  
FEMA Response GIS  
Remote Sensing  
202-591-6487

-----Original Appointment-----

**From:** Pandey, Siddharth <[spandey@Dewberry.com](mailto:spandey@Dewberry.com)>

**Sent:** Saturday, August 28, 2021 12:25 AM

**To:** Pandey, Siddharth; Dean, Paul; Russell, Glen; Vaughan, Christopher; Stephens, Kimberly; Barker, Adam

**Subject:** Daily FEMA Remote Sensing Coordination Call - Hurricane Ida

**When:** Occurs every day effective 8/29/2021 until 9/17/2021 from 2:30 PM to 3:00 PM (UTC-05:00) Eastern Time (US & Canada).

**Where:** Microsoft Teams Meeting

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## Microsoft Teams meeting

### Join on your computer or mobile app

[Click here to join the meeting](#)

### Or call in (audio only)

[+1 571-360-4685,,246867666#](#) United States, Arlington

Phone Conference ID: 246 867 666#

[Find a local number](#) | [Reset PIN](#)

[Learn More](#) | [Meeting options](#)

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